UNIVERSITY OF MICHIGAN
College of Engineering
Curriculum Committee Meeting
Tuesday, August 29, 2023

Attending: Achilleas Anastasopoulos, Jack Baker, Robert Bordley, Yavuz Bozer, Chris Fidkowski, Fei Gao, Odest Chad Jenkins, Amir Kamil, Leena Lalwani, Xiaogan Liang, Emmanuelle Marquis, Frank Marsik, Eric Rutherford, Saadet Albayrak Guralp, Roxanne Walker

Support Staff: Mercedes Carmona, Betsy Dodge, Matthew Faunce

Call to Order: 1:33 PM

Adjourned: 2:05 PM

Agenda:

1. Approval of 4.4.2023 Meeting Minutes (Page 9) – **APPROVED**
2. LSA Course Guide added to CARF Summaries Table
    a. In the CARF Summaries Table (see below), this section is added with the reasoning as if new CoE Course CARFs are interested in being included in the LSA Course Guide, they must be able to meet an LSA requirement to qualify. This section in the table is to monitor if new, deleted, or existing courses are in the LSA Course Guide.
    b. An inquiry to the LSA Course Guide support staff is waiting for a response. We will update the committee when a response is received.
3. 8.29.2023 Agenda Inconsistencies
    a. During the lack of access experienced across the university, the last agenda was not accurate in the CARF Summaries for the EECS CARFs Bulk Review. If you would like an updated version of the agenda, please email carmonam@umich.edu.

CARF SUMMARIES

PAGE	SUBJECT	COURSE #	ACTION	SUMMARY	EFFECTIVE TERM	MIN. GRADE REQ. FOR ENF. PREPREQ	IS COURSE ON LSA COURSE GUIDE?	APPROVED	NOTES & REVISIONS	TABLED
11	ECE	527	NEW		WT 2024	C	ADD	CONDITIONAL APPROVAL	Permission of instructor needs to be moved to Add Consent (checkbox checked) in the Grading Basis and removed from the Enforced Prerequisite listing.	
25	EECS	453	MOD	Change to Credit Exclusions	WT 2024	C	YES	APPROVED		

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28	EECS	461	MOD	Change to Enforced Prerequisite	WT 2024	C	YES	CONDITIONAL APPROVAL	Updating Contact Hours (Page 3) for Lab to 2 Hours.	
31	IOE	310	MOD	Change to Enforced Prerequisite	WT 2024	C-	YES	APPROVED		
34	IOE	333	MOD	Change to Enforced and Advisory Prerequisites	WT 2024	C-	YES	APPROVED		
37	IOE	366	MOD	Change to Enforced Prerequisite	WT 2024	C-	YES	APPROVED		
40	IOE	422	DEL		WT 2024		REMOVE	APPROVED		
43	IOE	474	MOD	Change to Enforced and Advisory Prerequisites	WT 2024	C-	YES	APPROVED		
46	ROB	450	NEW		WT 2024	C	ADD	CONDITIONAL APPROVAL	Make change to Course Description, “Primary goal is to challenge students…”	
53	CHEM	511	MOD	Change to Advisory Prerequisites	WT 2024	NO	YES	APPROVED	Cross listed with MATSCIE 510.	

EECS CARFs with Subject Changes to ECE or CSE – Bulk Review

PAGE	SUBJECT	COURSE #	ACTION	SUMMARY	EFFECTIVE TERM	MIN. GRADE REQ. FOR ENF. PREPREQ	IS COURSE ON LSA COURSE GUIDE?	APPROVED	NOTES & REVISIONS	TABLED
56	EECS	500	MOD		FT 2024	NO	YES	APPROVED		
59	EECS	501	MOD		FT 2024	C	YES	APPROVED		
62	EECS	502	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED		
65	EECS	503	MOD		FT 2024	NO	YES	APPROVED		
68	EECS	505	MOD	Change to Credit Exclusion.	FT 2024	C	YES	APPROVED		
71	EECS	506	MOD		FT 2024	C	YES	APPROVED		
74	EECS	508	MOD		FT 2024	C	YES	APPROVED		
77	EECS	509	MOD	Change to Course Description and Course Credit Type.	FT 2024	NO	YES	APPROVED		
80	EECS	511	MOD		FT 2024	NO	YES	APPROVED		
83	EECS	512	MOD		FT 2024	NO	YES	APPROVED		
86	EECS	514	MOD		FT 2024	NO	YES	APPROVED		
89	EECS	515	MOD		FT 2024	NO	YES	APPROVED		
92	BIOMEDE	516	MOD		FT 2024	NO	YES	APPROVED	Cross listed with EECS 516.	
95	SPACE	595	MOD		FT 2024	NO	YES	APPROVED	Cross listed with EECS 518.	

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98	NERS	575	MOD		FT 2024	NO	YES	APPROVED	Cross listed with EECS 519.	
101	EECS	520	MOD		FT 2024	NO	YES	APPROVED		
104	EECS	521	MOD		FT 2024	NO	YES	APPROVED		
107	EECS	525	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED		
110	EECS	526	MOD		FT 2024	NO	YES	APPROVED		
113	EECS	528	MOD		FT 2024	NO	YES	APPROVED		
116	EECS	529	MOD		FT 2024	NO	YES	APPROVED		
119	EECS	531	MOD		FT 2024	NO	YES	APPROVED		
122	EECS	533	MOD		FT 2024	NO	YES	APPROVED		
125	EECS	534	MOD		FT 2024	NO	YES	APPROVED		
128	EECS	535	MOD		FT 2024	NO	YES	APPROVED		
131	EECS	536	MOD		FT 2024	C	YES	APPROVED		
134	EECS	538	MOD		FT 2024	NO	YES	APPROVED	Cross listed with APPPHYS 550 and PHYSICS 650.	
137	EECS	539	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED	Cross listed with APPPHYS 551 and PHYSICS 651.	
140	EECS	544	MOD		FT 2024	NO	YES	APPROVED		
143	EECS	550	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED		

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146	EECS	551	MOD	Change to Credit Exclusion.	FT 2024	NO	YES	APPROVED		
149	EECS	554	MOD		FT 2024	NO	YES	APPROVED		
152	EECS	555	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED		
155	EECS	556	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED		
158	EECS	557	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED		
161	EECS	558	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED		
164	EECS	559	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED		
167	MECHENG	561	MOD		FT 2024	NO	YES	APPROVED	Cross listed with EECS 561	
170	EECS	563	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED		
173	EECS	564	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED		
176	EECS	565	MOD	Change to Advisory Prerequisite and Credit Exclusion.	FT 2024	NO	YES	APPROVED		
179	EECS	566	MOD		FT 2024	NO	YES	APPROVED		
182	EECS	572	MOD		FT 2024	NO	YES	APPROVED		
185	EECS	574	MOD		FT 2024	NO	YES	APPROVED		
188	EECS	575	MOD		FT 2024	NO	YES	APPROVED		
191	EECS	576	MOD		FT 2024	NO	YES	APPROVED		

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194	EECS	582	MOD		FT 2024	NO	YES	APPROVED		
197	EECS	583	MOD		FT 2024	NO	YES	APPROVED		
200	EECS	584	MOD		FT 2024	NO	YES	APPROVED		
203	EECS	587	MOD		FT 2024	NO	YES	APPROVED		
206	EECS	588	MOD		FT 2024	NO	YES	APPROVED		
209	EECS	589	MOD		FT 2024	NO	YES	APPROVED		
212	EECS	590	MOD		FT 2024	NO	YES	APPROVED		
215	EECS	591	MOD	Change to Course Components.	FT 2024	NO	YES	APPROVED		
218	EECS	592	MOD		FT 2024	NO	YES	APPROVED		
221	EECS	593	MOD		FT 2024	NO	YES	APPROVED		
224	EECS	595	MOD		FT 2024	NO	YES	APPROVED	Cross listed with LING 541 and SI 561.	
227	EECS	598	MOD	Change to Course Description.	FT 2024	NO	YES	APPROVED		
230	EECS	599	MOD	Change to Course Description.	FT 2024	NO	YES	APPROVED		
233	EECS	601	MOD		FT 2024	NO	YES	APPROVED		
236	EECS	602	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED		
239	EECS	605	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED		

PAGE	SUBJECT	COURSE #	ACTION	SUMMARY	EFFECTIVE TERM	MIN. GRADE REQ. FOR ENF. PREPREQ	IS COURSE ON LSA COURSE GUIDE?	APPROVED	NOTES & REVISIONS	TABLED
243	EECS	620	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED		
246	EECS	631	MOD	Change to Advisory Prerequisite and Course Components.	FT 2024	NO	YES	APPROVED		
249	EECS	633	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED		
252	EECS	634	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED	Cross listed with APPPHYS 611 and PHYSICS 611.	
255	PHYSICS	542	MOD		FT 2024	NO	YES	APPROVED	Cross listed with EECS 638.	
258	EECS	650	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED		
261	EECS	659	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED		
264	EECS	670	MOD	Change to Advisory Prerequisite.	FT 2024	NO	YES	APPROVED		
267	EECS	692	MOD	Change to Enforced Prerequisite	FT 2024	C	YES	APPROVED		
270	EECS	698	MOD	Change to Course Description, Grading Basis, Advisory Prerequisite, and Course Components.	FT 2024	NO	YES	APPROVED		
273	EECS	699	MOD	Change to Course Title and Abbreviated Title.	FT 2024	NO	YES	APPROVED		
276	EECS	700	MOD	Change to Course Description.	FT 2024	NO	YES	APPROVED		
279	EECS	720	MOD		FT 2024	NO	YES	APPROVED		
282	EECS	730	MOD	Change to Course Description.	FT 2024	NO	YES	APPROVED		
285	EECS	735	MOD		FT 2024	NO	YES	APPROVED		
288	EECS	750	MOD	Change to Course Description.	FT 2024	NO	YES	APPROVED		

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291	EECS	755	MOD		FT 2024	NO	YES	APPROVED		
294	EECS	760	MOD	Change to Course Description.	FT 2024	NO	YES	APPROVED		
297	EECS	765	MOD		FT 2024	NO	YES	APPROVED		
300	EECS	820	MOD		FT 2024	NO	YES	APPROVED		
303	EECS	990	MOD	Change to Course Components.	FT 2024	NO	YES	APPROVED		
306	EECS	995	MOD		FT 2024	NO	YES	APPROVED		

UNIVERSITY OF MICHIGAN
College of Engineering
Curriculum Committee Meeting
Tuesday, April 4, 2023

Attending: Xiaogan Liang (Chair), Robert Bordley, Yavuz Bozer, Andrew DeOrio, Jessy Grizzle, Roman Hryciw, Xianzhe Jia, Leena Lalwani, Kathellen Panagis, Ken Powell, Eric Rutherford, Rachael Schmedlen, Katie Snyder, Roxanne Walker, Steven Yalisove, Won Sik Yang

Support Staff: Stacie Benison, Mercedes Carmona, Betsy Dodge, Matthew Faunce

Call to Order: 1:36pm

Adjourned: 2:07pm

AGENDA

1. Approval of 3.21.2023 Meeting Minutes (Page 2) - **APPROVED**
2. Aerospace Concentration in Robotics – Action Item (Page 4) - **APPROVED**
    a. Adding a concentration as autonomy has always played a large role in aerospace engineering. There has been high interest from Aerospace students in Robotics.
        i. Concentration to be implemented for Fall 2023. The requirements listed have been created and adhere to the policy for Engineering Concentrations.
            1. 12+ credits are required, only technical and general electives can be used
            2. Up to three research credits can count towards a concentration with Program Advisor pre-approval
            3. Courses must be letter graded and cannot be taken for Pass/Fail
            4. Not available to students pursuing dual degrees or SUGS masters in the same area per policy for concentrations
            5. C- or better for all courses and GPA must be 2.0 and above
        ii. 1 linear algebra course (Choices in ROB, AERO, MATH), 1 Core AERO Robotics course, and 2 more courses from Robotics, Dynamics and Control, and/or Math, Computation, Machine Learning, and Data-Drive Modeling.
    b. A question was raised as to why SUGS students cannot take this concentration and was explained that the concentration is adhering to the Engineering Concentration policy and Rackham Rules, which excludes SUGS students.
    c. Letter grading will need to be reviewed for a requirement as S and U courses can fall into this category and the concentration may not want these courses included.
        i. Suggestion to revise grading requirement as Letter Grading (A-E) if they wish not to include S and U courses.
    d. Ken states he will follow up and double check the concentration policy to make sure everything is thorough with the questions raised.

CARF SUMMARIES

PAGE	SUBJECT	COURSE #	ACTION	SUMMARY	EFFECTIVE TERM	MIN. GRADE REQ. FOR ENF. PREPREQ	APPROVED	NOTES & REVISIONS	TABLED
7	CSE	543	NEW		WT 2024	NO	CONDITIONAL APPROVAL	Consider adding Undergraduate credit and review both Advisory and Enforced Prerequisite.	
32	EECS	402	MOD	Changes to Course Description and Enforced Prerequisite	WT 2024	NO	CONDITIONAL APPROVAL	Obtain Home Department Chair signature.	
35	MATSCIE	281	NEW		WT 2024	NO	CONDITIONAL APPROVAL	Cross listed with ANTHRARC 281. Update Course Description to 46-word version.	

1210 LSA Building
500 S. State Street
Ann Arbor, MI 48109-1382
Phone: 734.763.2113
Fax: 734.936.3148
ro.curriculum@umich.edu
ro.umich.edu

Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☑ New Course
- ☐ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-05
Effective Term: Winter 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Subject: Catalog:	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 527
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☑	Course Title (full title)	Course Title (full title) Power Semiconductor Devices
☑	Abbreviated Title (20 char)	Abbreviated Title (20 char) Power Semicon Device
☑	Course Description (Please limit to 50 words and attach separate sheet if necessary) Introduction to power semiconductor devices. Analysis of DC and switching behavior of power MOSFETs, IGBT, HEMT, thyristor, Schottky diode, PiN diode, and emerging devices. Power semiconductor materials, device fabrication, packaging, and thermal modeling. Use of commercial numerical simulation software to model power device performance.	
☑	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☑	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Catalog:

☑	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
☑	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) EECS 320 or EECS 421 or graduate standing or permission of the instructor Minimum grade requirement: C
☐	Credit Exclusions	Credit Exclusions
☑	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☑ Discussion ☐ Independent Study Graded Component ☑ ☐ ☐ ☐ ☐ ☐ Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer	

Cognizant Faculty Member Name: Becky Peterson Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:	Achilleas Anastasopoulos	Print: Achilleas Anastasopoulos	Date: 5/24/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:	Heath Hofmann	Print:Heath Hofmann	Date: 5/5/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description	Course Description Introduction to power semiconductor devices. Analysis of DC and switching behavior of power MOSFETs, IGBT, HEMT, thyristor, Schottky diode, PiN diode, and emerging devices. Power semiconductor materials, device fabrication, packaging, and thermal modeling. Use of commercial numerical simulation software to model power device performance.
Class Length	Class Length Full term
Contact hours (lecture):	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation) 1
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
This course satisfies the following degree requirements:
UG EE: Upper Level EE Elective
UG CE: EECS Elective
UG CS and UG DS: Flex. Tech. Elec.
ECE graduate programs: This course counts as a Major Area course for Solid State and Nanotechnology Area. For the Power & Energy Area, it can count as a Major Area course after approval by an advisor.

Special resources of facilities required for this course:
Course project use Synopsys Atlas and Silvaco TCAD software provided by CAEN

Supporting statement:
This course has been taught five times previously. The course draws graduate students from multiple sub-disciplines in ECE (power, VLSI/IC, solid state, embedded systems, and MEMS) as well as from MSE, Chem Eng, and other departments.

Past offerings:
Fall 2014: 20 students
Fall 2016: 9 students
Fall 2018: 15 students
Fall 2020: 22 students
Fall 2022: 48 students

EECS 598 Section 005, Fall 2022
Power Semiconductor Devices

Instructor:	Prof. Becky Peterson, blpeters@umich.edu
Course Website:	The course will be run through the Canvas site "EECS 598 005 FA 2022". Recorded lectures, pdfs of lecture notes, weekly quizzes, homework assignments, announcements and grades, and other materials will be posted on Canvas. All course events will be listed on the Canvas Calendar.
Announcements:	I use Canvas Announcements to communicate with the class. So that you do not miss important information, I encourage you to "Enable Notification" and select "Notify immediately" for *Announcement*. Instructions are here.
Lectures:	Lectures are **Mondays and Wednesdays 1:30-3:00pm in 1003 EECS**. Unless you are ill or have extenuating circumstances, the expectation is that you will attend most lectures in person. Lecture note pdfs will be posted before each class. Lecture recordings will be posted after class. The recordings are intended for review, or for watching if you must miss class.
Discussion Sections:	Discussions are held **Fridays at 1:30-2:30pm** or **2:30-3:30pm in 104 EWRE**. Attendance and participation is required. Discussions will be a mix of review, presentation of details regarding the homework assignments, and training and practice sessions with simulation software. In addition, I will address your questions about the course material. You may attend either session regardless of your registration; the two sessions will be identical. Unless you are ill or there are extenuating circumstances, you are expected to attend in person.
Illness and Mask Policy	If you are ill, please stay home and, insofar as your health allows, join lectures, discussion and/or office hours via Zoom. If you will join a Discussion by Zoom, please email me in advance so I can note your attendance. The class zoom link is https://umich.zoom.us/j/96100936889, Meeting ID: 961 0093 6889, Passcode: powersemi To protect one another, during class and office hours the use of high-quality masks are recommended but not required. Masks and COVID rapid tests are available free (while supplies last) to anyone with an MCard at any U-M CSTP testing location, including Pierpont.
Office Hours:	Office Hours will be held **Mondays at 3-4pm in 2411 EECS** and **Wednesdays 12:15-1:15pm in 2311 EECS**. Office hours are optional.
Questions:	We will use Piazza for course-related questions. Sign up for Piazza here: https://piazza.com/umich/fall2022/eecs598005fa2022. For informational requests (clarifying a typo, question about an assignment), please make your posts open so that all students can receive the same information. If you have a matter requiring 1-1 discussion, please send email to Prof. Peterson with "EECS 598" in the subject line.

Prerequisites: This course assumes a working knowledge of introductory semiconductor physics and devices. Resources for reviewing these concepts are given in the Supplemental Textbooks section below. The pre-requisite is EECS 320 (Introduction to Semiconductor Devices) or equivalent, graduate standing, or permission of the instructor. If you would like access to my EECS 320 Canvas site from a previous semester (with recorded lectures), please let me know.

Main Textbook: B. J. Baliga, *Fundamentals of Power Semiconductor Devices, Second Edition*, Springer, 2019, ISBN: 978-3-319-93988-9. Available for pdf download, e-pub online access, or you can purchase a *MyCopy Softcover* (printed version) for $39.99 from Springer. To access, go to this page and click on "Available Online": https://search.lib.umich.edu/catalog/record/99187265941106381
A hardcopy is also on reserve in AAEL.

Supplemental Textbooks (Chapter 7 only) B. El-Kareh and L. N. Hutter, *Silicon Analog Components*, Springer International Publishing, 2020, ISBN 978-3-030-15085-3. Available for pdf download, e-pub online access, or you can purchase *MyCopy Softcover* (printed) for $39.99 from Springer. To access, go here and click on "Available Online": https://search.lib.umich.edu/catalog/record/99187274838306381

(Chapter 1 only) Farid Medjdoub and Krzysztof Iniewski, Eds., *Gallium nitride (GaN) physics, devices and technology*, CRC Press, 2015, ISBN 9781482220032. Available for download here:
https://search.lib.umich.edu/catalog/record/99187341914506381

For those who wish to review semiconductor physics:

- Robert F. Pierret, *Semiconductor device fundamentals,* Addison-Wesley, Reading, Mass., 1996, ISBN 0201543931 (a great book, but not available online). A hardcopy is on reserve in AAEL.
- Donald A. Neamen, *Semiconductor physics and devices: basic prinicples, 3rd ed.*, McGraw-Hill, Boston, Mass., 2003, https://search.lib.umich.edu/catalog/record/990085824500106381 (also a very good book; available online)
- S. M. Sze, *Physics of semiconductor devices*, Wiley, New York, 1981 or later edition, (good for reference, not as good for learning) https://onlinelibrary.wiley.com/doi/book/10.1002/0470068329

Online textbook access: Note: you must be on campus, or use VPN, or use the proxy to download the books. For information on U-M VPN: https://its.umich.edu/enterprise/wifi-networks/vpn/getting-started. To use the proxy, see the instructions here https://www.lib.umich.edu/find-borrow-request/access-online-resources/remote-access/using-browser-bookmark. The proxy is useful for downloading library and journal documents when off campus.

If you have problems accessing the textbooks, please contact the Engineering Librarian, Paul Grochowski at grocho@umich.edu.

Simulation Software:

We will use CAEN-based device simulation softwares Silvaco and Sentaurus. I will provide tutorials during Discussion sections.

All U-M students have access to these softwares via on-campus CAEN computer labs or Linux Remote Login Service. The remote service is restricted to those whose primary residence is within a 50-mile radius of North Campus. See https://caen.engin.umich.edu/software/licensing/access-to-synopsys-tools/ for details.

Grading:

Grades for this course will be posted in Canvas, and will be based on:

- Homeworks (five, each 5.6%) 28%
- Weekly Lecture Quizzes: (12 each @ 1%) 12%
- Discussion Attendance and Participation (12 each @ 0.5%) 6%
- Simulation Project 1 18%
- Simulation Project 2 18%
- Presentation 18%

Letter grades are assigned based on final course numerical grades.
> 90.0% will always be some sort of A (A-, A, or A+)
> 80.0% will always be some sort of B (B-, B, or B+) or better
> 70.0% will always be some sort of C (C-, C, or C+) or better
All students are graded on the same scale and the course is not curved: if everyone gets above a 90%, everyone gets an A-/A/A+. I may lower the % breakpoint for the entire class (i.e. 87% might be the A/B breakpoint in one semester), i.e. grades can only go "up" from what is listed above.

Assignment details and due dates will be posted on Canvas during the semester. See the Course Outline for the general scheme. There are no exams.

Grades on individual assignments will be posted via Canvas. For homework and simulation projects, graded assignments will be returned privately online. If you have questions about the grading of a specific assignment, you must contact me within two weeks of that grade posting in Canvas.

Homework:

The purpose of homework is to learn. I strongly encourage you to discuss homework with other students and learn from each other. For many of the assignments, I will provide spreadsheets to streamline analytical calculations so that problems can focus on device analysis and design. Homework is turned in and graded individually, and the work you turn in must be your own.

Lecture Quizzes:

To encourage you to engage fully with the lectures and keep up with the material, each week there will be a short quiz on Canvas to confirm your basic understanding of the material covered in the lectures that week. The quizzes will be open book and should take < 5 min if you have engaged with the lectures. The quiz on Monday and Wednesday's lectures will be posted by Wednesday 6:00pm, and must be completed before the following Sunday at 11:59pm.

Simulation Projects:	There will be two projects on power device simulation using the commercial platforms Silvaco Atlas and Synopsys Sentaurus. Projects are done individually by each student. In each project, you will begin with a vendor-provided device example and then explore and explain its operation by modifying the simulation. Each student will write a project report, which will be graded. Detailed tutorials will be given on the software packages during Discussion Sections; no prior knowledge is assumed.
Presentations:	Presentations will occur at the end of the semester during scheduled lecture periods. The 15-min presentations will be done by groups of three, and you may choose your own group. Each group will select a topic related to the course. This could be a current research area, a characterization technique, or a new commercial class of devices. Each group will write a two-page abstract describing the topic; I will respond to approve the topic and give feedback. During the presentations, each person in the group must speak. Presentations will be followed by student Q & A. The grade will be based on the abstract, the presentation slides, the oral presentation, your response to peer questions and your questions on others' presentations. A detailed assignment and the schedule of presentations will be announced via Canvas.
Late Policy:	In fairness to all students, late assignments receive a score of zero, with the following exception: I allow one 24-hour extension on Homework per semester per student. Please email me BEFORE the due date to request this exception, and I will reply to confirm. Other assignments are not eligible for this exception. If there is an extenuating circumstance that goes beyond the above, please contact me to discuss as far in advance as possible.
Assignment Submission Procedure:	All graded work this semester will be submitted online. For Homework and Simulation projects, pdf format with total document size < 20 MB is required. It is your responsibility to make the pdf readable and a reasonable size. It is easy to make a scan of a physical document using most smartphones. Once scanned, you can then upload to Canvas or send it to yourself via email for later submission. iOS devices have a document scanner function built into the **Notes app**, video here: **iPhone** (2:46). Android devices can scan documents directly using the **Google Drive app**, video here: **Android** (2:15)
Honor Code Statement:	All work in this class shall be in accordance with the College of Engineering's Honor Code (https://elc.engin.umich.edu/honor-council/). Specifically, *"It is a violation of the Honor Code for students to submit, as their own, work that is not the result of their own labor and thoughts. Work which includes material derived in any way from the efforts of another author, either by direct quotation or paraphrasing, should be fully and properly documented. To avoid plagiarism, it is necessary to cite all sources of both ideas and direct quotations, including those found on the internet. The basic principle is to provide enough information so that the original source of material can be located."* By turning in assignments for this course, you are automatically confirming that, as per the Honor Code: "[you] have neither given nor received unauthorized aid on this [assignment], nor have [you] concealed any violations of the Honor Code."

Religious Holidays or other conflicts	If a course requirement or due date falls on a religious holiday that you observe, or another obligation (e.g. conference attendance), please let me know at least two weeks in advance, so we can determine how to accommodate the conflict, per University guidance.
Accommodations for Students with Disabilities:	If you need an accommodation, please let me know as early as possible in the semester. If you already have an Accommodations Letter or a Verified Individualized Services and Accommodations (VISA) form, please provide a signed copy. If you do not have one, please work with the Services for Students with Disabilities (SSD, 734-763-3000; http://ssd.umich.edu) office. Any information you provide to me and to SSD will be treated as private and confidential.
Statement on Recordings:	Course lectures and discussions may be audio/video recorded and made available to other students in this course. As part of your participation in this course, you may be recorded. If you do not wish to be recorded, please contact Prof. Peterson the first week of class to discuss alternative arrangements. Students may not record or distribute any class activity without written permission from the instructor, except as necessary as part of approved accommodations for students with disabilities. Any approved recordings may only be used for the student's own private use.
My Practices for Faculty/ Student Interactions	It is my goal to create a safe environment that is conducive to productive learning. I am committed to creating a learning environment that is free of Prohibited Conduct, including gender-based and sexual harassment, sexual violence, retaliation, discrimination and intimidation. To accomplish this, I pledge to: • **Conduct office hour and meetings only in University venues, with doors open.** Students who wish to have confidential conversations with me may schedule a private meeting via Zoom or may ask to have a closed-door meeting. Requests for closed-door meetings must be made by you in writing (email), and can be sent on the spot. • **Document all pre-scheduled meetings (at times outside LEC/DIS/Office Hours) with students via Google Calendar and/or university email.** If students drop by for an informal meeting, no documentation will be provided. • **Conduct all individual communications using University-provided platforms such as email, Canvas, Slack, Piazza, and so on.** You should be aware that as Director of the Lurie Nanofabrication Facility, I am an "Individual with Reporting Obligation" (IRO). People in certain U-M roles are considered IROs and are required to report suspected Prohibited Conduct to the Equity, Civil Rights and Title IX Office at the University of Michigan. This means that if you tell me about suspected Prohibited Conduct, I must report it. If you want to talk with someone who is not an IRO, please see the resource list below.

Other Resources For Students

Michigan Engineering C.A.R.E. Center, https://care.engin.umich.edu/ is a central hub to help you find support for issues both inside and outside the classroom. The bottom of their website contains key phone numbers. Their homepage also contains a link to submit a concern report, which anyone can complete if they are concerned about the well-being of a student.

Counseling and Psychological Services (CAPS) (24 hour line) 734-764-8312
Provides a variety of services include tele-counseling, personal counseling, crisis support, virtual outreach, and referrals to community providers.

Other important numbers and links

- Call 911 for life-threatening emergencies. Dialing 911 from your cell phone will connect you with the local emergency dispatch. If you are on-campus, tell them you are calling from U-M Ann Arbor. Dialing 911 from a campus phone will dial University police dispatch.
- UM Police Department (24 hour line) 734-763-1131
- Ann Arbor Police Department 734-994-2911 (non-emergency dispatch)
- U-M Psychiatric Emergency (24 hour line) 734-996-4747
- Sexual Assault Prevention and Awareness Center (SAPAC) (24 hour emergency) 734-936-333; (non-emergency) 734-764-7771
- Avalon Healing Center (24 hour line) 313-474-SAFE, for immediate crisis intervention, advocacy and medical-forensic healthcare for survivors of sexual violence of all ages
- If a situation involves potential sexual and gender-based misconduct or discrimination, please fill out an Equity, Civil Rights, and Title IX Office incident report form. The University strongly encourages the prompt reporting of these types of allegations. For additional information, including confidential and non-confidential resources, please visit this website.
- For situations involving student conflicts or alleged violations of the student statement of responsibilities, please visit the Office of Student Conflict Resolution report form.

EECS 598-005
Fall 2022 Course Outline
(Assignments and deadlines are posted in Canvas)

Module	Topics Covered	Readings	Related Assignments
1: Physics	Introduction Charge Transport Minority-Carrier Processes Breakdown Voltage Edge Termination	Baliga Chapters 1, 2, 3	Weekly Lecture Quizzes Homework 1
2: Rectifiers, fab & package	Schottky Rectifiers PiN Rectifiers	Baliga Chapters 4, 5	Weekly Lecture Quizzes Homework 2 Simulation Project 1
	Thermal Effects and Packaging Substrates & Device Fabrication	Lectures Notes	
3: Unipolar Transistors	MOSFET Review Vertical Power MOSFET	Baliga Chapter 6	Weekly Lecture Quizzes Homework 3 Simulation Project 2
	GaN HEMTs	Medjdoub & Iniewski, Ch. 1	
	Power Silicon FET (LDMOS)	El-Kareh & Hunger, Ch. 7	
4: Bipolar Devices	Power BJT Thyristor IGBT	Baliga Chapters 7, 8 and 9	Weekly Lectures Quizzes Homework 4 (BJT/thyristor) Homework 5 (IGBT)
5: Student Presentations	-	-	Student Presentations

Fall 2018 Instructor Report of EECS 598-002: Special Topics for Becky Peterson

Project Title: **Central Campus Fall 2018 Evaluation**

Course Audience: **15**
Responses Received: **6**
Response Ratio: **40.0%**

Report Comments

This report is a summary that tabulates all quantitative ratings on a single page. Ratings are from the Fall 2018 teaching evaluations of EECS 598-002: Special Topics.

Prepared by: **Office of the Registrar**
Creation Date: **Mon, Dec 31, 2018**

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Responses to the University-wide questions about the course:

	SA	A	N	D	SD	N/A	Your Median	University-Wide Median	School/College Median
This course advanced my understanding of the subject matter.	5	1	0	0	0	0	4.9	4.5	4.7
My interest in the subject has increased because of this course.	5	1	0	0	0	0	4.9	4.1	4.6
I knew what was expected of me in this course.	5	0	1	0	0	0	4.9	4.4	4.6
Overall, this was an excellent course.	5	1	0	0	0	0	4.9	4.2	4.6
I had a strong desire to take this course.	5	1	0	0	0	0	4.9	4.0	4.5
As compared with other courses of equal credit, the workload for this course was... (SA=Much Lighter to SD=Much Heavier)	1	0	1	3	1	0	2.2	3.0	3.0

Responses to the University-wide questions about the instructor:

	SA	A	N	D	SD	N/A	Your Median	University-Wide Median	School/College Median
Overall, Becky Peterson was an excellent teacher.	6	0	0	0	0	0	5.0	4.5	4.7
Becky Peterson seemed well prepared for class meetings.	6	0	0	0	0	0	5.0	4.8	4.8
Becky Peterson explained material clearly.	5	1	0	0	0	0	4.9	4.6	4.7
Becky Peterson treated students with respect.	6	0	0	0	0	0	5.0	4.8	4.9

Responses to additional questions about the course:

	SA	A	N	D	SD	N/A	Your Median	University-Wide Median
Prerequisites provided adequate preparation for this course. (Q61)	4	0	1	0	0	1	4.9	4.3
The textbook made a valuable contribution to the course. (Q340)	3	2	1	0	0	0	4.5	3.7
I developed confidence in my abilities as an engineer.	4	2	0	0	0	0	4.8	4.1
I developed the ability to solve real world engineering problems.	4	2	0	0	0	0	4.8	4.1

The medians are calculated from Fall 2018 data. University-wide medians are based on all UM classes in which an item was used. The school/college medians in this report are based on classes that are graduate level with enrollment of 1 to 15 in College of Engineering.

University of Michigan
Fall 2020 Instructor Report Without Comments
EECS 598-001: Special Topics
Becky Peterson

16 out of 22 students responded to this evaluation.

Responses to University-wide questions about the course:

	SA	A	N	D	SD	N/A	Your Median	Univ-wide Median	School/College Median
This course advanced my understanding of the subject matter. (Q1631)	11	5	0	0	0	0	4.8	4.6	4.5
My interest in the subject has increased because of this course. (Q1632)	10	5	1	0	0	0	4.7	4.2	4.2
I knew what was expected of me in this course.(Q1633)	11	4	1	0	0	0	4.8	4.5	4.4
Overall, this was an excellent course.(Q1)	12	3	1	0	0	0	4.8	4.4	4.3
I had a strong desire to take this course.(Q4)	9	6	1	0	0	0	4.6	4.1	4.1
As compared with other courses of equal credit, the workload for this course was (SA=Much Lighter, A=Lighter, N=Typical, D=Heavier, SD=Much Heavier). (Q891)	3	3	4	5	1	0	3.0	2.9	2.8
How did you participate in this course? (SA=Attended most synchronously, A=Attended most asynchronously, N=Attended most in person, D=Attended some in person and some online). (Q1854)	6	8	0	1	0	0	4.3	4.7	4.5

Responses to University-wide questions about the instructor:

	SA	A	N	D	SD	N/A	Your Median	Univ-wide Median	School/College Median
Overall, Becky Peterson was an excellent teacher.(Q2)	10	6	0	0	0	0	4.7	4.7	4.7
Becky Peterson seemed well prepared for class meetings.(Q230)	12	4	0	0	0	0	4.8	4.8	4.8
Becky Peterson explained material clearly.(Q199)	12	4	0	0	0	0	4.8	4.7	4.7
Becky Peterson treated students with respect.(Q217)	13	2	0	0	0	0	4.9	4.9	4.9

Responses to questions about the course:

	SA	A	N	D	SD	N/A	Your Median	University-Wide Median
Prerequisites provided adequate preparation for this course. (Q61)	8	7	0	0	0	1	4.6	4.5
The textbook made a valuable contribution to the course. (Q64)	13	3	0	0	0	0	4.9	3.9
I developed confidence in my abilities as an engineer. (Q1769)	10	4	2	0	0	0	4.7	4.2
I developed the ability to solve real world engineering problems. (Q1770)	9	5	2	0	0	0	4.6	4.2
The discussion section was a valuable part of this course. (Q1771)	11	5	0	0	0	0	4.8	4.0

University of Michigan
Fall 2022 Instructor Report
EECS 598-005: Special Topics
Becky Peterson

43 out of 48 students responded to this evaluation.

Responses to University-wide questions about the course:

	SA	A	N	D	SD	N/A	Your Median	Univ-wide Median	School/College Median
This course advanced my understanding of the subject matter. (Q1631)	29	11	3	0	0	0	4.8	4.5	4.7
My interest in the subject has increased because of this course. (Q1632)	25	14	4	0	0	0	4.6	4.2	4.5
I knew what was expected of me in this course.(Q1633)	25	14	4	0	0	0	4.6	4.6	4.6
I had a strong desire to take this course.(Q4)	19	13	7	2	0	0	4.4	4.0	4.5
As compared with other courses of equal credit, the workload for this course was (SA=Much Lighter, A=Lighter, N=Typical, D=Heavier, SD=Much Heavier). (Q891)	3	4	25	11	0	0	2.9	3.0	3.0

Responses to University-wide questions about the instructor:

	SA	A	N	D	SD	N/A	Your Median	Univ-wide Median	School/College Median
Becky Peterson seemed well prepared for class meetings.(Q230)	37	3	2	0	0	1	4.9	4.8	4.8
Becky Peterson explained material clearly.(Q199)	31	8	3	0	0	0	4.8	4.7	4.7
Becky Peterson treated students with respect.(Q217)	38	3	1	0	0	0	4.9	4.8	4.9

Responses to questions about the course:

	SA	A	N	D	SD	N/A	Your Median
Overall, this was an excellent course. (Q1)	30	8	5	0	0	0	4.8
The textbook made a valuable contribution to the course. (Q64)	30	8	5	0	0	0	4.8
Prerequisites provided adequate preparation for this course. (Q61)	24	8	8	1	0	2	4.6
The discussion section was a valuable part of this course. (Q1771)	32	8	2	1	0	0	4.8
I developed confidence in my abilities as an engineer. (Q1769)	27	13	3	0	0	0	4.7
I developed the ability to solve real world engineering problems. (Q1770)	21	18	4	0	0	0	4.5

Responses to questions about the instructor:

	SA	A	N	D	SD	N/A	Your Median
Overall, Becky Peterson was an excellent teacher. (Q2)	35	6	2	0	0	0	4.9

The medians are calculated from Fall 2022 data. University-wide medians are based on all UM classes in which an item was used. The school/college medians in this report are based on classes that are graduate level with enrollment of 16 to 74 in College of Engineering.

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Fax: 734.936.3148
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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-06-15
Effective Term: Winter 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☐	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 453	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 453
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Principles of Machine Learning	Course Title (full title) Principles of Machine Learning
☐	Abbreviated Title (20 char) Principles of ML	Abbreviated Title (20 char) Principles of ML
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Covers fundamental principles of machine learning, including unsupervised learning (e.g., clustering, mixture models, dimension reduction), supervised learning (e.g., regression, classification, neural networks & deep learning), and reinforcement learning. For each topic, mathematical principles, key algorithmic ideas, and basic theoretical insights will be highlighted.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 453

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
☐	Enforced Prerequisite (254 char) EECS 280 and (STATS 250 or STATS 280 or STATS 412 or STATS 426 or EECS 301 or IOE 265 or TO 301) and (EECS 351 or MATH 214 or 217 or 296 or 417 or 419 or ROB 101). (C or better, No OP/F). Minimum grade requirement: C	Enforced Prerequisite (254 char) EECS 280 and (STATS 250 or STATS 280 or STATS 412 or STATS 426 or EECS 301 or IOE 265 or TO 301) and (EECS 351 or MATH 214 or 217 or 296 or 417 or 419 or ROB 101). (C or better, No OP/F). Minimum grade requirement: C
☑	Credit Exclusions No credit to a student who has taken EECS 445	Credit Exclusions No credit to a student who has taken EECS 445 or 545 or 553
☐	Course Components / Graded Component ☑ Lecture ☑ ☐ Seminar ☐ ☐ Recitation ☐ ☐ Lab ☐ ☑ Discussion ☐ ☐ Independent Study ☐ Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer	

Cognizant Faculty Member Name: Qing Qu Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative: Achilleas Anastasopoulos Print: Achilleas Anastasopoulos Date: 8/14/2023

CoE Curriculum Committee Chair: Print: Date:

Home Department Chair: Print: Shai Revzen for Dennis Sylvester Date: 2023-08-14

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	**Requested:**
Course Description Covers fundamental principles of machine learning, including unsupervised learning (e.g., clustering, mixture models, dimension reduction), supervised learning (e.g., regression, classification, neural networks & deep learning), and reinforcement learning. For each topic, mathematical principles, key algorithmic ideas, and basic theoretical insights will be highlighted.	Course Description Covers fundamental principles of machine learning, including unsupervised learning (e.g., clustering, mixture models, dimension reduction), supervised learning (e.g., regression, classification, neural networks & deep learning), and reinforcement learning. For each topic, mathematical principles, key algorithmic ideas, and basic theoretical insights will be highlighted.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation) 1	Contact hours (recitation) 1
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
In discussion with the CSE Undergraduate Curriculum Committee and the faculty member who developed the class, we came to the conclusion that there is substantial overlap between 453 and 445 in terms of methods taught. While the classes are geared for a different student audience in terms of mathematical background and type of applications discussed, a student who has taken one of these classes will not gain sufficient added value from the other class to justify awarding credits.

EECS 451 Digital Signal Processing was converted to EECS 351 in the 2014-2015 academic year because undergraduate students interested in signal processing wanted more and earlier opportunities to take courses on the subject. This cleared space at the 400-level for new relevant courses, and 453 is filling that gap. There is an extremely high demand for machine learning in ECE undergraduate students, and graduate students from other departments who find themselves unprepared for EECS 545/553 will find an excellent introduction in EECS 453.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-04-13
Effective Term: Winter 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☐	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 461	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 461
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Embedded Control Systems	Course Title (full title) Embedded Control Systems
☐	Abbreviated Title (20 char) Embedded Control	Abbreviated Title (20 char) Embedded Control
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Basic interdisciplinary concepts needed to implement a microprocessor based control system. Sensors and actuators. Quadrature decoding. Pulse width modulation. DC motors. Force feedback algorithms for human computer interaction. Real time operating systems. Networking. Use of Matlab to model hybrid dynamical systems. Autocode generation for rapid prototyping.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 461

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
☑	Enforced Prerequisite (254 char) [EECS 216 or 373; (C or better, No OP/F) or graduate standing Minimum grade requirement: C	Enforced Prerequisite (254 char) EECS 216; (C or better, No OP/F) or graduate standing Minimum grade requirement: C
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☑ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Jim Freudenberg Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:	Achilleas Anastasopoulos	Print: Achilleas Anastasopoulos	Date: 8/14/2023
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:	Shai Revzen	Print: Shai Revzen for Dennis Sylvester	Date: 2023-08-14
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Basic interdisciplinary concepts needed to implement a microprocessor based control system. Sensors and actuators. Quadrature decoding. Pulse width modulation. DC motors. Force feedback algorithms for human computer interaction. Real time operating systems. Networking. Use of Matlab to model hybrid dynamical systems. Autocode generation for rapid prototyping.	Course Description Basic interdisciplinary concepts needed to implement a microprocessor based control system. Sensors and actuators. Quadrature decoding. Pulse width modulation. DC motors. Force feedback algorithms for human computer interaction. Real time operating systems. Networking. Use of Matlab to model hybrid dynamical systems. Autocode generation for rapid prototyping.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab) 1	Contact hours (lab) 1

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:

Supporting statement:
At the time EECS 461 was started the CE degree program was still being defined and the signals and systems curriculum was in a state of flux. It made sense then to have alternate paths into the class. As it turned out EECS 216 is required for both EE and CE majors and over the years EECS 461 has grown to rely heavily on that material. A student having only EECS 373 would not have the correct background to succeed. This has never been major problem, but there are occasionally CS students who take EECS 373 and there are also CE students who postpone taking EECS 216 until their last semester and might therefore take EECS 373. This does not happen very often, but it would be cleaner if the prerequisite were adjusted to fit the way we actually teach the class.

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WTCourse Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-04-26
Effective Term: Winter 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☐	Dept (Home): Industrial & Operations Engin Subject: IOE Catalog: 310	Dept (Home): Industrial & Operations Engin Subject: IOE Catalog: 310
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Optimization and Computational Methods	Course Title (full title) Optimization and Computational Methods
☐	Abbreviated Title (20 char) Optim and Comp Meth	Abbreviated Title (20 char) Optim and Comp Meth
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Introduction to deterministic optimization models and computational algorithms with emphasis on linear and integer programming; simplex and branch-and-bound algorithms; duality, complementary slackness, and sensitivity analysis. Emphasis on decision making for real-world applications from transportation, healthcare, and other industrial domains.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: Undergraduate Max: 3 Graduate Max:	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Industrial & Operations Engin Catalog: 310

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
☑	Enforced Prerequisite (254 char) (MATH 214 or 216 or 256 or 286 or 316) and (IOE 202) and (ENGR 101 or 101X or 104 or 151 or EECS 100 or 183 or CMPTRSC 100 or 183); (C- or better) Minimum grade requirement: C-	Enforced Prerequisite (254 char) (MATH 214 or 216 or 256 or 286 or 316 or ROB 101) and (IOE 202) and (ENGR 101 or 101X or 104 or 151 or EECS 100 or 183 or CMPTRSC 100 or 183); (C- or better) Minimum grade requirement: C-
☐	Credit Exclusions	Credit Exclusions

☐

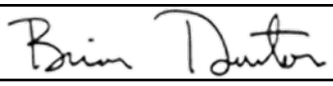
Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Amy Cohn Cognizant Faculty Member Title: Professor

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Leonora Lucaj Email: lucajl@umich.edu Phone: 734-764-3297

CoE Curriculum Committee Representative: Yavuz Bozer		Print: Yavuz Bozer	Date:05/24/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair: Brian Denton		Print: Brian Denton	Date: 05/25/2023
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	**Requested:**
Course Description Introduction to deterministic optimization models and computational algorithms with emphasis on linear and integer programming; simplex and branch-and-bound algorithms; duality, complementary slackness, and sensitivity analysis. Emphasis on decision making for real-world applications from transportation, healthcare, and other industrial domains.	Course Description Introduction to deterministic optimization models and computational algorithms with emphasis on linear and integer programming; simplex and branch-and-bound algorithms; duality, complementary slackness, and sensitivity analysis. Emphasis on decision making for real-world applications from transportation, healthcare, and other industrial domains.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Degree Requirement

Special resources of facilities required for this course:
All the software needed for learning how to use solvers **(e.g., Python and Pyomo)** for optimizing linear (integer) programming models taught by the course are available in any CAEN machine. The students have access to all the required software even outside the current lab space.

Supporting statement:
Cognizant Faculty & the Undergrad Program Committee have agreed after various discussions that ROB 101 should be treated as equivalent to Math 214 as an acceptable prerequisite for IOE 310. Many other Departments have already accepted this exception.

1210 LSA Building
500 S. State Street
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Phone: 734.763.2113
Fax: 734.936.3148
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ro.umich.edu

Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-04-19
Effective Term: Winter 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☐	Dept (Home): Industrial & Operations Engin Subject: IOE Catalog: 333	Dept (Home): Industrial & Operations Engin Subject: IOE Catalog: 333
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Human Factors and Ergonomics	Course Title (full title) Human Factors and Ergonomics
☐	Abbreviated Title (20 char) Human Factors Ergo	Abbreviated Title (20 char) Human Factors Ergo
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Introduction to human sensory, decision, control, and motor systems in the context of visual, auditory, cognitive and manual task evaluation and design. Problems with computer displays, illumination, noise, eye-hand coordination, as well as repetitive and high physical effort tasks are presented. Work place and vehicle design strategies used to resolve these are discussed.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: Undergraduate Max: 3 Graduate Max:	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Industrial & Operations Engin Catalog: 333

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☑	Advisory Prerequisite (254 char) Preceded or accompanied by IOE 265	Advisory Prerequisite (254 char)
☑	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Preceded or accompanied by IOE 265 Minimum grade requirement: C-
☐	Credit Exclusions	Credit Exclusions

☐

Course Components
- ☑ Lecture
- ☐ Seminar
- ☐ Recitation
- ☐ Lab
- ☐ Discussion
- ☐ Independent Study

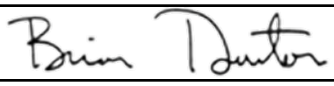
Graded Component
- ☑
- ☐
- ☐
- ☐
- ☐
- ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Yili Liu Cognizant Faculty Member Title: Professor

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Leonora Lucaj Email: lucajl@umich.edu Phone: 734-764-3297

CoE Curriculum Committee Representative: Yavuz Bozer		Print:	Yavuz Bozer	Date: 4/27/23
CoE Curriculum Committee Chair:		Print:		Date:
Home Department Chair: Brian Denton		Print:	Brian Denton	Date: 04/27/23
Cross-Listed Department Chair:		Print:		Date:
Cross-Listed Department Chair:		Print:		Date:
Cross-Listed Department Chair:		Print:		Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Introduction to human sensory, decision, control, and motor systems in the context of visual, auditory, cognitive and manual task evaluation and design. Problems with computer displays, illumination, noise, eye-hand coordination, as well as repetitive and high physical effort tasks are presented. Work place and vehicle design strategies used to resolve these are discussed.	Course Description Introduction to human sensory, decision, control, and motor systems in the context of visual, auditory, cognitive and manual task evaluation and design. Problems with computer displays, illumination, noise, eye-hand coordination, as well as repetitive and high physical effort tasks are presented. Work place and vehicle design strategies used to resolve these are discussed.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
This course is part of the required 33 credits of the IOE core requirements.

Special resources of facilities required for this course:

Supporting statement:
The "enforced" Notice is currently in the "Notes" on Wolverine Access as a written notice to the interested students, because we were told in the past that "accompanied by..." cannot be enforced and thus so listed. Now it appears it can be so listed (though still not enforced by the system). It is better to formally list it that way.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-04-26
Effective Term: Winter 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☐	Dept (Home): Industrial & Operations Engin Subject: IOE Catalog: 366	Dept (Home): Industrial & Operations Engin Subject: IOE Catalog: 366
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Introduction to Engineering Data Analytics	Course Title (full title) Introduction to Engineering Data Analytics
☐	Abbreviated Title (20 char) Intro Eng Data Analy	Abbreviated Title (20 char) Intro Eng Data Analy
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Introduction to data analysis methods and statistical tools, linear regression and correlation, multiple linear regression, stepwise selection, nonlinear regression, logistic regression, analysis of variance, introduction to design of experiments.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: Undergraduate Max: 3 Graduate Max:	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Industrial & Operations Engin Catalog: 366

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
☑	Enforced Prerequisite (254 char) (IOE 265 or STATS 265) and (MATH 214 or 216 or 256 or 286 or 316); (C- or better) Minimum grade requirement: C-	Enforced Prerequisite (254 char) (IOE 265 or STATS 265) and (MATH 214 or 216 or 256 or 286 or 316 or ROB 101); (C- or better) Minimum grade requirement: C-
☐	Credit Exclusions	Credit Exclusions

☐

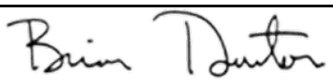
Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Eunshin Byon Cognizant Faculty Member Title: Associate Professor

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Leonora Lucaj Email: lucajl@umich.edu Phone: 734-764-3297

CoE Curriculum Committee Representative: Yavuz Bozer		Print: Yavuz Bozer	Date: 05/12/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair: Brian Denton		Print: Brian Denton	Date: 05/11/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Introduction to data analysis methods and statistical tools, linear regression and correlation, multiple linear regression, stepwise selection, nonlinear regression, logistic regression, analysis of variance, introduction to design of experiments.	Course Description Introduction to data analysis methods and statistical tools, linear regression and correlation, multiple linear regression, stepwise selection, nonlinear regression, logistic regression, analysis of variance, introduction to design of experiments.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Degree Requirement

Special resources of facilities required for this course:

Supporting statement:
Cognizant Faculty & the Undergrad Program Committee have agreed after various discussions that ROB 101 should be treated as equivalent to Math 214 as an acceptable prerequisite for IOE 366. Many other Departments have already accepted this exception.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☐ Modification of Existing Course
- ☑ Deletion of Existing Course

Date of Submission: 2023-05-17
Effective Term: Winter 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☐	Dept (Home): Industrial & Operations Engin Subject: IOE Catalog: 422	Dept (Home): Subject: Catalog:
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) ENTREPRENEURSHIP	Course Title (full title)
☐	Abbreviated Title (20 char) ENTREPRENEURSHIP	Abbreviated Title (20 char)
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Engineering students will explore the dynamics of turning an innovative idea into a commercial venture in an increasingly global economy. Creating a business plan originating in an international setting will: challenge students to innovate; manage risk, stress and failure; confront ethical problems: question cultural assumptions; and closely simulate the realities of life as an entrepreneur.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: Undergraduate Max: 3 Graduate Max:	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Industrial & Operations Engin Catalog: 422

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) Senior Standing	Advisory Prerequisite (254 char) Senior Standing
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components / Graded Component
- ☑ Lecture / ☑
- ☐ Seminar / ☐
- ☐ Recitation / ☐
- ☐ Lab / ☐
- ☐ Discussion / ☐
- ☐ Independent Study / ☐

Terms Typically Offered
- ☑ Fall
- ☐ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

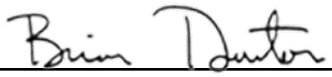
Cognizant Faculty Member Name: Debra Levantrosser Cognizant Faculty Member Title: Lecturer

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Leonora Lucaj Email: lucajl@umich.edu Phone: 734-764-3297

CoE Curriculum Committee Representative: Yavuz Bozer Print: Yavuz Bozer Date: 05/24/23

CoE Curriculum Committee Chair: Print: Date:

Home Department Chair: Brian Denton  Print: Brian Denton Date: 05/25/2023

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Engineering students will explore the dynamics of turning an innovative idea into a commercial venture in an increasingly global economy. Creating a business plan originating in an international setting will: challenge students to innovate; manage risk, stress and failure; confront ethical problems: question cultural assumptions; and closely simulate the realities of life as an entrepreneur.	Course Description
Class Length Full term	Class Length
Contact hours (lecture): 3	Contact hours (lecture):
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
It is an IOE Technical Elective, students need 12 credits of Tech Electives in 3 different groups.

Special resources of facilities required for this course:
N/A

Supporting statement:
This course has not been taught in a few years and there are no plans to offer it again.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-03-30
Effective Term: Winter 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☐	Dept (Home): Industrial & Operations Engin Subject: IOE Catalog: 474	Dept (Home): Industrial & Operations Engin Subject: IOE Catalog: 474
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) SIMULATION	Course Title (full title) SIMULATION
☐	Abbreviated Title (20 char) SIMULATION	Abbreviated Title (20 char) SIMULATION
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Simulation of complex discrete-event systems with applications in industrial and service organizations. Course topics include modeling and programming simulations in one or more high-level computer packages such as ProModel or GSPP/H; input distribution modeling; analysis of simulation output data. The course will obtain a team simulation project.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Industrial & Operations Engin Catalog: 474

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☑	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char) IOE 373
☑	Enforced Prerequisite (254 char) IOE 316 and IOE 366 and IOE 373; C- or better OR Graduate Standing Minimum grade requirement:	Enforced Prerequisite (254 char) IOE 316 and IOE 366, preceded or accompanied by IOE 373; C- or better OR Graduate Standing Minimum grade requirement: C-
☐	Credit Exclusions	Credit Exclusions

☐

Course Components
- ☑ Lecture
- ☐ Seminar
- ☐ Recitation
- ☐ Lab
- ☐ Discussion
- ☐ Independent Study

Graded Component
- ☑
- ☐
- ☐
- ☐
- ☐
- ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

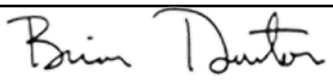
Cognizant Faculty Member Name: Luis Garcia-Guzman Cognizant Faculty Member Title: Lecturer

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Leonora Lucaj Email: lucaj@umich.edu Phone: 734-764-3297

CoE Curriculum Committee Representative: Yavuz Bozer Print: Yavuz Bozer Date: 4/27/23

CoE Curriculum Committee Chair: Print: Date:

Home Department Chair: Brian Denton  Print: Brian Denton Date: 04/27/23

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Simulation of complex discrete-event systems with applications in industrial and service organizations. Course topics include modeling and programming simulations in one or more high-level computer packages such as ProModel or GSPP/H; input distribution modeling; analysis of simulation output data. The course will obtain a team simulation project.	Course Description Simulation of complex discrete-event systems with applications in industrial and service organizations. Course topics include modeling and programming simulations in one or more high-level computer packages such as ProModel or GSPP/H; input distribution modeling; analysis of simulation output data. The course will obtain a team simulation project.
Class Length Full term	Class Length Full term
Contact hours (lecture): 4	Contact hours (lecture): 4
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
This course is part of the required 33 credits of the IOE core requirements.

Supporting statement:
As long as students have IOE 366 and IOE 316 completed beforehand, then IOE 474 can be preceded or accompanied by IOE 373. IOE 474 does not require the use or knowledge of Python which is the coding language taught in IOE 373. Discrete event simulation software (ProModel) is taught and used in IOE 474

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☑ New Course
- ☐ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-08-18
Effective Term: Winter 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Subject: Catalog:	Dept (Home): Robotics Subject: ROB Catalog: 450
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☑	Course Title (full title)	Course Title (full title) Robotics Capstone
☑	Abbreviated Title (20 char)	Abbreviated Title (20 char) Robotics Capstone
☑	Course Description (Please limit to 50 words and attach separate sheet if necessary) The primary goal of this course is to challenge students to synthesize the knowledge acquired through their Robotics undergraduate courses at U-M and, using a systematic and iterative design and analysis process, apply it to solving a real, open-ended Robotics problem.	
☑	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: Undergraduate Max: 4 Graduate Max:	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☑	Course Credit Type Undergraduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Catalog:

☑	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
☑	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Junior standing; TCHNCLCM 350; at least one of ROB 310, 311, 320, 330, or 340 Minimum grade requirement: C
☐	Credit Exclusions	Credit Exclusions

☑	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☑ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☐ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Kira Barton Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Kayla Dombrowski Email: kakelle@umich.edu Phone: 734-936-7999

CoE Curriculum Committee Representative:	Odest C Jenkins	Print: Odest Chadwicke Jenkins	Date: 8/21/2023
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:	Dawn Tilbury	Print: Dawn Tilbury	Date: 8-18-23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description	Course Description The primary goal of this course is to challenge students to synthesize the knowledge acquired through their Robotics undergraduate courses at U-M and, using a systematic and iterative design and analysis process, apply it to solving a real, open-ended Robotics problem.
Class Length	Class Length Full term
Contact hours (lecture):	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab) 2

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Culmination course required for all students in ROB BSE program

Special resources of facilities required for this course:

Supporting statement:
Need a way to assess a student's ability to synthesize all of the content from their courses.

Course Objectives
Upon completion of this course, students should be able to:
1. Solve an open-ended robotics design problem including considerations of performance, standards/stakeholder criteria, and societal impact. The problem must provide opportunities for creative robot design that leverages fundamental concepts from: front-end design of robots with humans in the loop, robot design principles and methodologies, robot learning, robot control, robot perception, fundamental analysis, and proof-of-concept iterative prototyping. Each student team works on a different project and everyone participates in project proposal development, reporting, and design presentations.
2. Apply a robot design, prototype, and analysis process appropriate to the robotic problem at hand, including unstructured creativity as part of a structured robot design problem.
3. Generate and evaluate robot design concepts after gaining a sound understanding of the problem background and incorporating concepts learned through ROB 250 and 350, as well as the ROB 300-level courses in perception, reasoning, and acting, designing and building robots, sensors and signals, and robot operating systems.

Course Outcomes
As a result of this course, students should be able to achieve the following:

1. Given a qualitative and open-ended "real-world" robotics design problem, suggest a solution based on robot design principles and quantitative analysis methods while considering societal implications of the solution.
2. Learn to work effectively in engineering teams to resolve conflict and meet quantitative engineering objectives established during the project. Learn to communicate effectively with peers, project sponsors, key stakeholders, advisors, and/or mentors.
3. Learn to consider unstructured creativity as a natural part of a structured design process and to systematically generate concepts using methods such as brainstorming and decomposition.
4. Learn to make appropriate assumptions and exercise engineering judgment in solving an open-ended problem.
5. Manage and plan large design projects using time management tools, and be able to handle uncertain and incomplete information effectively to meet project goals.
6. Learn to clearly request and exchange quantitative information, and to communicate project results, to audiences of varying expertise levels.
7. Learn patent and literature search methods, benchmarking, and other general forms of background independent learning.
8. Integrate past course material to advance basic system concepts to a prototyping level, providing support for all design decisions by defensible engineering analysis and reasoning.

ROB 450 – Senior Capstone

Course Structure

- 10 learning modules with quizzes and in-class activities (all students, all projects)
- Independent Team Project in Group of 4-5, with design reviews & peer evaluations
- Teamwork and Meetings with Instructors

Course Description

The primary goal of this course is to challenge students to synthesize the knowledge acquired through their Robotics undergraduate courses at U-M and, using a systematic and iterative design and analysis process, apply it to solving a real, open-ended Robotics problem.

Learning Objectives

Apply knowledge from previous courses towards the design of a solution for a real-world problem. In particular, this course will provide the following learning objectives:

- Navigating group dynamics that incorporate concepts regarding diversity, equity, and inclusion
- Presenting technical concepts to different audience members from various stakeholder groups
- Iterating with sponsors and key stakeholders to identify specific project deliverables, and determine an appropriate validation process
- Communication: scope, presentations, interviews / sponsor interactions
- Develop and apply robotic design principles that consider important societal implications such as ethical, environmental, and safety critical design requirements
- Applying important technical and problem-solving skills learned throughout the undergraduate curriculum to solve a real-world problem

Prerequisites

TCHCLCM 350, and at least one of ROB 310, 311, 320, 330 or 340. Authorization to use the ROB undergraduate machine shop.

Required Textbook and Materials

No textbook is required. All required readings will be posted/linked in Canvas. Students will also need to collect and synthesize information from suggested references, research, prior Robotics coursework, and stakeholders or subject matter experts. Safety glasses are required for build and test activities.

Course Objectives

Upon completion of this course, students should be able to:

1. Solve an open-ended robotics design problem including considerations of performance, standards/stakeholder criteria, and societal impact. The problem must provide opportunities for creative robot design that leverages fundamental concepts from: front-end design of

robots with humans in the loop, robot design principles and methodologies, robot learning, robot control, robot perception, fundamental analysis, and proof-of-concept iterative prototyping. Each student team works on a different project and everyone participates in project proposal development, reporting, and design presentations.
2. Apply a robot design, prototype, and analysis process appropriate to the robotic problem at hand, including unstructured creativity as part of a structured robot design problem.
3. Generate and evaluate robot design concepts after gaining a sound understanding of the problem background and incorporating concepts learned through ROB 204 and 350, as well as the ROB 300-level courses in perception, reasoning, and acting, designing and building robots, sensors and signals, and robot operating systems.

Course Outcomes

As a result of this course, students should be able to achieve the following:

1. Given a qualitative and open-ended "real-world" robotics design problem, suggest a solution based on robot design principles and quantitative analysis methods while considering societal implications of the solution.
2. Learn to work effectively in engineering teams to resolve conflict and meet quantitative engineering objectives established during the project. Learn to communicate effectively with peers, project sponsors, key stakeholders, advisors, and/or mentors.
3. Learn to consider unstructured creativity as a natural part of a structured design process and to systematically generate concepts using methods such as brainstorming and decomposition.
4. Learn to make appropriate assumptions and exercise engineering judgment in solving an open-ended problem.
5. Manage and plan large design projects using time management tools, and be able to handle uncertain and incomplete information effectively to meet project goals.
6. Learn to clearly request and exchange quantitative information, and to communicate project results, to audiences of varying expertise levels.
7. Learn patent and literature search methods, benchmarking, and other general forms of background independent learning.
8. Integrate past course material to advance basic system concepts to a prototyping level, providing support for all design decisions by defensible engineering analysis and reasoning.

Course Evaluation Policy

Class participation evaluated through: 20%

- Quizzes
- in-class discussions
- active participation in class activities

Team project evaluated through: 70%

- project proposal
- project written reports
- project oral presentations

Peer/self evaluation 10%

Course Syllabus

	Course Topic / Task	Due date	Deliverable
LM	Design process overview	week 1	quiz / class activity
LM	Societal implications of robot design	week 2	quiz / class activity
LM	Problem definition + stakeholder engagement	week 3	quiz / class activity
PT	Project Proposal: problem defn, requirements, stakeholders, initial prototype	week 4	oral presentation
LM	Concept exploration / selection	week 5	quiz / class activity
LM	Robot design and build principles	week 6	quiz / class activity
LM	Bio-inspired robot design	week 7	quiz / class activity
PT	Design Review: project start through iterative prototypes	week 8	oral presentation + written report
LM	Robot learning	week 9	quiz / class activity
LM	Robot perception	week 10	quiz / class activity
LM	Robot control	week 11	quiz / class activity
LM	Engineering Analysis	week 12	quiz / class activity
PT	Design Review: interative prototypes + V&V	week 13	oral presentation + written report
PT	Design expo - final prototype demonstration	week 14	oral presentation
PT	Final report	week 15	written report
PT	Documentation / final files to sponsor	week 15	files + prototypes
LM = learning module			
PT = project task			

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-08-11
Effective Term: Winter 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☐	Dept (Home): Chemistry Subject: CHEM Catalog: 511	Dept (Home): Chemistry Subject: CHEM Catalog: 511
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	MATERIALS SCIENCE MATSCIE 510	MATERIALS SCIENCE MATSCIE 510
☐	Course Title (full title) Materials Chemistry	Course Title (full title) Materials Chemistry
☐	Abbreviated Title (20 char) Materials Chem	Abbreviated Title (20 char) Materials Chem
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) This course presents concepts in materials chemistry. The main topics covered include structure and characterization, macroscopic properties and synthesis and processing.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Chemistry Catalog: 510

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☑	Advisory Prerequisite (254 char) CHEM 461, BIOLCHEM 415, CHEM 430; and permission of course director	Advisory Prerequisite (254 char) CHEM 302 and CHEM 461
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components / Graded Component
- ☑ Lecture — ☑
- ☐ Seminar — ☐
- ☐ Recitation — ☐
- ☐ Lab — ☐
- ☐ Discussion — ☐
- ☐ Independent Study — ☐

Terms Typically Offered
- ☐ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Patti Vogel Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Email: Phone:

CoE Curriculum Committee Representative: Print: Date:

CoE Curriculum Committee Chair: Print: Date:

Home Department Chair: Print: Date:

LSA Curriulum Committee Chair: Timothy A. McKay Print: Timothy McKay Date: 8/21/2023

Cross-Listed Department Chair: Elizabeth A. Holm Print: Elizabeth A. Holm Date: 8/14/2023

Cross-Listed Department Chair: Print: Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	**Requested:**
Course Description This course presents concepts in materials chemistry. The main topics covered include structure and characterization, macroscopic properties and synthesis and processing.	Course Description This course presents concepts in materials chemistry. The main topics covered include structure and characterization, macroscopic properties and synthesis and processing.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation) 3	Contact hours (recitation) 3
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Cross-listed dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
Updating advisory prerequisites to reflect the current requirements for CHEM 511/MATSCIE 510.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-25
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 500	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 500
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Tutorial Lecture Series in System Science	Course Title (full title) Tutorial Lecture Series in System Science
☐	Abbreviated Title (20 char) Tutorial Sys Sci	Abbreviated Title (20 char) Tutorial Sys Sci
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Students are introduced to the frontiers of System Science research. Sections 01, 02 and 03 are devoted, respectively, to Communications, Control, and Signal Processing. The tutorials are delivered by leaders of the respective research fields, invited from academia and industry. The presentations are self-contained and accessible to all graduate students in System Science.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 1 Undergraduate Max: Graduate Max: 1	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 500

☐

Grading Basis
- ☐ Graded (A – E)
- ☐ Credit/No Credit
- ☑ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) Graduate standing	Advisory Prerequisite (254 char) Graduate standing
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components / Graded Component
- ☑ Lecture ☐
- ☑ Seminar ☑
- ☐ Recitation ☐
- ☐ Lab ☐
- ☐ Discussion ☐
- ☐ Independent Study ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Raj Nadakuditi Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 734-647-1754

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/14/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print:Heath Hofmann	Date: 7/14/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Students are introduced to the frontiers of System Science research. Sections 01, 02 and 03 are devoted, respectively, to Communications, Control, and Signal Processing. The tutorials are delivered by leaders of the respective research fields, invited from academia and industry. The presentations are self-contained and accessible to all graduate students in System Science.	Course Description Students are introduced to the frontiers of System Science research. Sections 01, 02 and 03 are devoted, respectively, to Communications, Control, and Signal Processing. The tutorials are delivered by leaders of the respective research fields, invited from academia and industry. The presentations are self-contained and accessible to all graduate students in System Science.
Class Length Full term	Class Length Full term
Contact hours (lecture): 1	Contact hours (lecture): 1
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-25
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 501	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 501
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Probability and Random Processes	Course Title (full title) Probability and Random Processes
☐	Abbreviated Title (20 char) Prob&Random Proc	Abbreviated Title (20 char) Prob&Random Proc
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Introduction to probablility and random processes. Topics include probability axioms, sigma algebras, random vectors, expectation, probability distributions and densities, Poisson and Wiener processes, stationary processes, autocorrelation. spectral density, effects of filtering, linear least-squares estimation, and convergence of random sequences.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 501

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
☐	Enforced Prerequisite (254 char) EECS 301; (C or better, No OP/F) or Graduate Standing Minimum grade requirement: C	Enforced Prerequisite (254 char) EECS 301; (C or better, No OP/F) or Graduate Standing Minimum grade requirement: C
☐	Credit Exclusions	Credit Exclusions

☐

Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☑ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Achilleas Anastasopoulos Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person:Punam Vyas Email: vyas@umich.edu Phone: 734-647-1754

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/14/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/14/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Introduction to probablility and random processes. Topics include probability axioms, sigma algebras, random vectors, expectation, probability distributions and densities, Poisson and Wiener processes, stationary processes, autocorrelation. spectral density, effects of filtering, linear least-squares estimation, and convergence of random sequences.	Course Description Introduction to probablility and random processes. Topics include probability axioms, sigma algebras, random vectors, expectation, probability distributions and densities, Poisson and Wiener processes, stationary processes, autocorrelation. spectral density, effects of filtering, linear least-squares estimation, and convergence of random sequences.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation) 1	Contact hours (recitation) 1
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-18
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 502	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 502
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Stochastic Processes	Course Title (full title) Stochastic Processes
☐	Abbreviated Title (20 char) Stoch Processes	Abbreviated Title (20 char) Stoch Processes
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Correlations and spectra. Quadratic mean calculus, including stochastic integrals and representations, wide-sense stationary processes (filtering, white noise, sampling, time averages, moving averages, auto-regression). Renewal and regenerative processes. Markov chains, random walk and run, branching processes. Markov jump processes, uniformization, reversibility, and queueing applications.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 502

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☑	Advisory Prerequisite (254 char) EECS 501	Advisory Prerequisite (254 char) ECE 501
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components / Graded Component
- ☑ Lecture — ☑
- ☐ Seminar — ☐
- ☐ Recitation — ☐
- ☐ Lab — ☐
- ☐ Discussion — ☐
- ☐ Independent Study — ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Vijay Subramanian Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone:763-2305

CoE Curriculum Committee Representative:		Print:Anastasopoulos, A	Date: 6/8/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 6/8/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Correlations and spectra. Quadratic mean calculus, including stochastic integrals and representations, wide-sense stationary processes (filtering, white noise, sampling, time averages, moving averages, auto-regression). Renewal and regenerative processes. Markov chains, random walk and run, branching processes. Markov jump processes, uniformization, reversibility, and queueing applications.	Course Description Correlations and spectra. Quadratic mean calculus, including stochastic integrals and representations, wide-sense stationary processes (filtering, white noise, sampling, time averages, moving averages, auto-regression). Renewal and regenerative processes. Markov chains, random walk and run, branching processes. Markov jump processes, uniformization, reversibility, and queueing applications.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

Course Approval Request Form

Office of the Registrar, University of Michigan

1210 LSA Building
500 S. State Street
Ann Arbor, MI 48109-1382
Phone: 734.763.2113
Fax: 734.936.3148
ro.curriculum@umich.edu
ro.umich.edu

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-25
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 503	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 503
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Introduction to Numerical Electromagnetics	Course Title (full title) Introduction to Numerical Electromagnetics
☐	Abbreviated Title (20 char) Intro Num Em	Abbreviated Title (20 char) Intro Num Em
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Introduction to numerical methods in electromagnetics including finite difference, finite element and integral equation methods for static, harmonic and time dependent fields; use of commercial software for analysis and design purposes; applications to open and shielded transmission lines, antennas, cavity resonances and scattering.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 503

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 330	Advisory Prerequisite (254 char) EECS 330
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☐ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Leung Tsang Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 734-647-1754

CoE Curriculum Committee Representative: Print: Achilleas Anastasopoulos Date: 6/8/23

CoE Curriculum Committee Chair: Print: Date:

Home Department Chair: Print: Heath Hofmann Date: 6/8/23

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Introduction to numerical methods in electromagnetics including finite difference, finite element and integral equation methods for static, harmonic and time dependent fields; use of commercial software for analysis and design purposes; applications to open and shielded transmission lines, antennas, cavity resonances and scattering.	Course Description Introduction to numerical methods in electromagnetics including finite difference, finite element and integral equation methods for static, harmonic and time dependent fields; use of commercial software for analysis and design purposes; applications to open and shielded transmission lines, antennas, cavity resonances and scattering.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-25
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 505	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 505
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Computational Data Science and Machine Learning	Course Title (full title) Computational Data Science and Machine Learning
☐	Abbreviated Title (20 char) Comp. DS & ML	Abbreviated Title (20 char) Comp. DS & ML
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Introduction to computational methods for identifying patterns and outliers in large data sets. Topics include the singular and eigenvalue decomposition, independent component analysis, graph analysis, clustering, linear, regularized, sparse and non-linear model fitting, deep, convolutional and recurrent neural networks. Students program methods; lectures and labs emphasize computational thinking and reasoning.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 505

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
☐	Enforced Prerequisite (254 char) [EECS 301 or MATH 425 or STATS 250 or 412 or 426 or IOE 265; (C or better, No OP/F)] or Graduate Standing Minimum grade requirement: C	Enforced Prerequisite (254 char) [EECS 301 or MATH 425 or STATS 250 or 412 or 426 or IOE 265; (C or better, No OP/F)] or Graduate Standing Minimum grade requirement: C
☑	Credit Exclusions Students cannot earn credit for both EECS 505 and EECS 551.	Credit Exclusions Students cannot earn credit for both ECE 505 and ECE 551.

☐

Course Components / Graded Component
- ☑ Lecture — ☑
- ☐ Seminar — ☐
- ☑ Recitation — ☐
- ☐ Lab — ☐
- ☐ Discussion — ☐
- ☐ Independent Study — ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Raj Nadakuditi Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person:Punam Vyas Email:vyas@umich.edu Phone:734-647-1754

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 6/8/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print:Heath Hofmann	Date: 6/8/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	**Requested:**
Course Description Introduction to computational methods for identifying patterns and outliers in large data sets. Topics include the singular and eigenvalue decomposition, independent component analysis, graph analysis, clustering, linear, regularized, sparse and non-linear model fitting, deep, convolutional and recurrent neural networks. Students program methods; lectures and labs emphasize computational thinking and reasoning.	Course Description Introduction to computational methods for identifying patterns and outliers in large data sets. Topics include the singular and eigenvalue decomposition, independent component analysis, graph analysis, clustering, linear, regularized, sparse and non-linear model fitting, deep, convolutional and recurrent neural networks. Students program methods; lectures and labs emphasize computational thinking and reasoning.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation) 1	Contact hours (recitation) 1
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:
No special equipment or facilities except a classroom with table seating — students program on their computers in the lab component of in-class time.

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

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☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-25
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 506	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 506
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Design of Power Electronics	Course Title (full title) Design of Power Electronics
☐	Abbreviated Title (20 char) Dsgn Pwr Electronics	Abbreviated Title (20 char) Dsgn Pwr Electronics
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) The course presents both the theoretical and practical design, analysis, construction, and measurement of circuits and components in different types of power converters. The course will teach concepts and present case studies through lectures, homework, design problems, and a final project.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 506

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
☐	Enforced Prerequisite (254 char) EECS 418; (C or better, No OP/F) or Graduate Standing Minimum grade requirement: C	Enforced Prerequisite (254 char) EECS 418; (C or better, No OP/F) or Graduate Standing Minimum grade requirement: C
☐	Credit Exclusions	Credit Exclusions

☐

Course Components / Graded Component

	Course Components	Graded Component
☑	Lecture	☑
☐	Seminar	☐
☐	Recitation	☐
☐	Lab	☐
☐	Discussion	☐
☐	Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Al-Thaddeus Avestruz Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email:vyas@umich.edu Phone:734-647-1754

CoE Curriculum Committee Representati	Print: Achilleas Anastasopoulos	Date: 7/14/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: Heath Hofmann	Print: Heath Hofmann	Date: 7/14/23
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description The course presents both the theoretical and practical design, analysis, construction, and measurement of circuits and components in different types of power converters. The course will teach concepts and present case studies through lectures, homework, design problems, and a final project.	Course Description The course presents both the theoretical and practical design, analysis, construction, and measurement of circuits and components in different types of power converters. The course will teach concepts and present case studies through lectures, homework, design problems, and a final project.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-25
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 508	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 508
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Control and Modeling of Power Electronics	Course Title (full title) Control and Modeling of Power Electronics
☐	Abbreviated Title (20 char) CoMPEL	Abbreviated Title (20 char) CoMPEL
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) The course presents both the theoretical and practical modeling and control of power converters Topics include small-signal models; digital and analog control; switched, sampled-data, and averaged models; large signal considerations; distributed power; and tools for computer modeling and simulation.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 508

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☑ Instructor Consent
- ☐ No Consent

Drop Consent
- ☐ Department Consent
- ☑ Instructor Consent
- ☐ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
☐	Enforced Prerequisite (254 char) EECS 418; (C or better, No OP/F) or Graduate Standing Minimum grade requirement: C	Enforced Prerequisite (254 char) EECS 418; (C or better, No OP/F) or Graduate Standing Minimum grade requirement: C
☐	Credit Exclusions	Credit Exclusions

☐

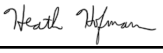
Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Al-Thaddeus Avestruz Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person:Punam Vyas Email:vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/27/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print:Heath Hofmann	Date: 7/27/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description The course presents both the theoretical and practical modeling and control of power converters Topics include small-signal models; digital and analog control; switched, sampled-data, and averaged models; large signal considerations; distributed power; and tools for computer modeling and simulation.	Course Description The course presents both the theoretical and practical modeling and control of power converters Topics include small-signal models; digital and analog control; switched, sampled-data, and averaged models; large signal considerations; distributed power; and tools for computer modeling and simulation.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-06-22
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 509	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 509
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) BIOMEMS	Course Title (full title) BIOMEMS
☐	Abbreviated Title (20 char) BIOMEMS	Abbreviated Title (20 char) BIOMEMS
☑	Course Description (Please limit to 50 words and attach separate sheet if necessary) Covers the latest advances in bioMEMS, with specific attention to Microsystems targeting development biology and cell culture. We will use an organism's development --from genome to multicellular tissue-- as a framework for teaching bioMEMS devices: from microPCR chips to microfluidic mixers to tissue scaffolds. The aim is to provide students familiar with microfabrication and Microsystems with a context from which to view and evaluate bioMEMS devices and innovations. We will cover implantable and diagnostic microsystems in the later part of the course.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☑	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 509

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☐ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Euisik Yoon Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/14/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/14/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description This course will cover the latest advances in bioMEMS, with specific attention to Microsystems targeting development biology and cell culture. We will use an organism's development --from genome to multicellular tissue-- as a framework for teaching bioMEMS devices: from microPCR chips to microfluidic mixers to tissue scaffolds. The aim is to provide students familiar with microfabrication and Microsystems with a context from which to view and evaluate bioMEMS devices and innovations. We will cover implantable and diagnostic microsystems in the later part of the course.	Course Description Covers the latest advances in bioMEMS, with specific attention to Microsystems targeting development biology and cell culture. We will use an organism's development --from genome to multicellular tissue-- as a framework for teaching bioMEMS devices: from microPCR chips to microfluidic mixers to tissue scaffolds. The aim is to provide students familiar with microfabrication and Microsystems with a context from which to view and evaluate bioMEMS devices and innovations. We will cover implantable and diagnostic microsystems in the later part of the course.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-25
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 511	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 511
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Integrated Analog/Digital Interface Circuits	Course Title (full title) Integrated Analog/Digital Interface Circuits
☐	Abbreviated Title (20 char) A/D Interfaces	Abbreviated Title (20 char) A/D Interfaces
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Covers most of the well known analog to digital conversion schemes. These include the flash, folding, multi-step and pipeline Nyquist rate, architectures. Oversampling converters are also discussed. Practical design work is a significant part of this course. Students design and model complete converters. Projects are overseen/graded by faculty and may also involve mentoring by representatives from external organizations.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 511

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

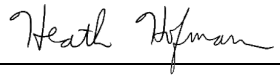
	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 413/P.I.	Advisory Prerequisite (254 char) EECS 413/P.I.
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☑ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☐ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Michael Flynn Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:	Print: Achilleas Anastasopoulos	Date: 8/3/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: 	Print: Heath Hofmann	Date: 8/3/23
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Covers most of the well known analog to digital conversion schemes. These include the flash, folding, multi-step and pipeline Nyquist rate, architectures. Oversampling converters are also discussed. Practical design work is a significant part of this course. Students design and model complete converters. Projects are overseen/graded by faculty and may also involve mentoring by representatives from external organizations.	Course Description Covers most of the well known analog to digital conversion schemes. These include the flash, folding, multi-step and pipeline Nyquist rate, architectures. Oversampling converters are also discussed. Practical design work is a significant part of this course. Students design and model complete converters. Projects are overseen/graded by faculty and may also involve mentoring by representatives from external organizations.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab) 1	Contact hours (lab) 1

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-06-19
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 512	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 512
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Amorphous and Microcrystalline Semiconductor Thin Film Devices	Course Title (full title) Amorphous and Microcrystalline Semiconductor Thin Film Devices
☐	Abbreviated Title (20 char) Amorph Sem	Abbreviated Title (20 char) Amorph Sem
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Introduction and fundamentals of physical, optical and electrical properties of amorphous and microcrystalline semiconductor based devices: MIM structures, Schottky diodes, p-i-n junctions, heterojunctions, MIS structures, thin-film transistors, solar cells, threshold and memory switching devices and large area x-ray radiation detectors.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 512

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 421	Advisory Prerequisite (254 char) EECS 421
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Jerzy Kanicki Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person:Punam Vyas Email:vyas@umich.edu Phone:647-1754

CoE Curriculum Committee Representative:		Print:Achilleas Anastasopoulos	Date: 7/18/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print:Heath Hofmann	Date: 7/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Introduction and fundamentals of physical, optical and electrical properties of amorphous and microcrystalline semiconductor based devices: MIM structures, Schottky diodes, p-i-n junctions, heterojunctions, MIS structures, thin-film transistors, solar cells, threshold and memory switching devices and large area x-ray radiation detectors.	Course Description Introduction and fundamentals of physical, optical and electrical properties of amorphous and microcrystalline semiconductor based devices: MIM structures, Schottky diodes, p-i-n junctions, heterojunctions, MIS structures, thin-film transistors, solar cells, threshold and memory switching devices and large area x-ray radiation detectors.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Free Elective

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-06-13
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 514	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 514
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Advanced MEMS Devices and Technologies	Course Title (full title) Advanced MEMS Devices and Technologies
☐	Abbreviated Title (20 char) Advanced MEMS	Abbreviated Title (20 char) Advanced MEMS
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Advanced micro electro mechanical systems (MEMS) devices and technologies. Transduction techniques, including piezoelectric, electromagnetic, electrothermal, and resonant techniques. Chemical, gas, and biological sensors, microfluidic and biomedical devices. Micromachining technologies such as laser machining and microdrilling, EDM, materials such as SiC and diamond. Sensor and actuator analysis and design through CAD.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 4 Undergraduate Max: Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 514

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 414	Advisory Prerequisite (254 char) EECS 414
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Khalil Najafi Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email:vyas@umich.edu Phone:647-1754

CoE Curriculum

Committee Representative: Print: Achilleas Anastasopoulos Date:6/13/23

CoE Curriculum Committee Chair: Print: Date:

Home Department Chair: Print: Heath Hofmann Date:6/13/23

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	**Requested:**
Course Description Advanced micro electro mechanical systems (MEMS) devices and technologies. Transduction techniques, including piezoelectric, electromagnetic, electrothermal, and resonant techniques. Chemical, gas, and biological sensors, microfluidic and biomedical devices. Micromachining technologies such as laser machining and microdrilling, EDM, materials such as SiC and diamond. Sensor and actuator analysis and design through CAD.	Course Description Advanced micro electro mechanical systems (MEMS) devices and technologies. Transduction techniques, including piezoelectric, electromagnetic, electrothermal, and resonant techniques. Chemical, gas, and biological sensors, microfluidic and biomedical devices. Micromachining technologies such as laser machining and microdrilling, EDM, materials such as SiC and diamond. Sensor and actuator analysis and design through CAD.
Class Length Full term	Class Length Full term
Contact hours (lecture): 4	Contact hours (lecture): 4
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Core Course

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-06-13
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 515	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 515
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Integrated Microsystems	Course Title (full title) Integrated Microsystems
☐	Abbreviated Title (20 char) Integ. Microsystems	Abbreviated Title (20 char) Integ. Microsystems
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Review of interface electronics for sense and drive and their influence on device performance, interface standards, MEMS and circuit noise sources, packaging and assembly techniques, testing and calibration approaches, and communication in integrated microsystems. Applications, including RF MEMS, optical MEMS, bioMEMS, and microfluidics. Design project using CAD and report preparation.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 4 Undergraduate Max: Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 515

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 414	Advisory Prerequisite (254 char) EECS 414
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions Four Credits Only, None.	Credit Exclusions

☐

Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Yogesh Gianchandani Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/14/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print:Heath Hofmann	Date: 7/14/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Review of interface electronics for sense and drive and their influence on device performance, interface standards, MEMS and circuit noise sources, packaging and assembly techniques, testing and calibration approaches, and communication in integrated microsystems. Applications, including RF MEMS, optical MEMS, bioMEMS, and microfluidics. Design project using CAD and report preparation.	Course Description Review of interface electronics for sense and drive and their influence on device performance, interface standards, MEMS and circuit noise sources, packaging and assembly techniques, testing and calibration approaches, and communication in integrated microsystems. Applications, including RF MEMS, optical MEMS, bioMEMS, and microfluidics. Design project using CAD and report preparation.
Class Length Full term	Class Length Full term
Contact hours (lecture): 4	Contact hours (lecture): 4
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Core Course

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

Course Approval Request Form

Office of the Registrar, University of Michigan

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☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-06-19
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	REQUESTED LISTING
☐	Dept (Home): Biomedical Engineering Subject: BIOMEDE Catalog: 516	Dept (Home): Biomedical Engineering Subject: BIOMEDE Catalog: 516
☑	☑ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number Elec Engin & Computer Sci - EECS - 516	☑ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number Elec & Comp Eng - ECE - 516
☐	Course Title (full title) Medical Imaging Systems	Course Title (full title) Medical Imaging Systems
☐	Abbreviated Title (20 char) Med Imag Sys	Abbreviated Title (20 char) Med Imag Sys
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Principles of modern medical imaging systems. For each modality the basic physics is described leading to a systems model of the imager. Fundamental similarities between the imaging equations of different modalities will be stressed. Modalities covered include radiography, x-ray computed tomography (CT), NMR imaging (MRI), and real-time ultrasound.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Biomedical Engineering Catalog: 516

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char) EECS 351	Advisory Prerequisite (254 char) EECS 351
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☐ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Doug Noll Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/20/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: TIM BRUNS	Date: 6/20/23
Cross-Listed Department Chair:	Heath Hofmann	Print: Heath Hofmann	Date: 7/20/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Principles of modern medical imaging systems. For each modality the basic physics is described leading to a systems model of the imager. Fundamental similarities between the imaging equations of different modalities will be stressed. Modalities covered include radiography, x-ray computed tomography (CT), NMR imaging (MRI), and real-time ultrasound.	Course Description Principles of modern medical imaging systems. For each modality the basic physics is described leading to a systems model of the imager. Fundamental similarities between the imaging equations of different modalities will be stressed. Modalities covered include radiography, x-ray computed tomography (CT), NMR imaging (MRI), and real-time ultrasound.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Cross-listed dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-12
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING			**REQUESTED LISTING**		
☐	Dept (Home): Space Science & Engineering Subject: SPACE Catalog: 595			Dept (Home): Space Science & Engineering Subject: SPACE Catalog: 595		
☑	☑ Course is Cross-Listed with Other Departments			☑ Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Elec Eng & Comp Sci - EECS - 518			Elec & Comp Eng - ECE - 518		
☐	Course title (full title) Magnetosphere and Solar Wind			Course Title (full title) Magnetosphere and Solar Wind		
☐	Abbreviated Title (20 char) Magnetosphere			Abbreviated Title (20 char) Magnetosphere		
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) General principles of magnetohydrodynamics; theory of the expanding atmospheres; properties of solar wind, interaction of solar wind with the magneto-sphere of the Earth and other planets; bow shock and magnetotail, trapped particles, auroras.					
☐	Full Term Credit Hours Undergraduate Min: 3 Undergraduate Max: 3	Graduate Min: 3 Graduate Max: 3		Half Term Credit Hours Undergraduate Min: Undergraduate Max:	Graduate Min: Graduate Max:	
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student					
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:			☐ Course is Y graded ☐ Can be taken more than once in the same term		

Subject: Space Science & Engineering Catalog: 595

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char) Graduate standing	Advisory Prerequisite (254 char) Graduate Standing
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components
- ☑ Lecture
- ☐ Seminar
- ☐ Recitation
- ☐ Lab
- ☐ Discussion
- ☐ Independent Study

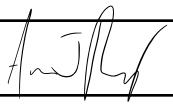
Graded Component
- ☑
- ☐
- ☐
- ☐
- ☐
- ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Shasha Zou Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/20/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Aaron Ridley	Date: 05/12/23
Cross-Listed Department Chair:		Print: Heath Hofmann	Date: 7/20/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description General principles of magnetohydrodynamics; theory of the expanding atmospheres; properties of solar wind, interaction of solar wind with the magneto-sphere of the Earth and other planets; bow shock and magnetotail, trapped particles, auroras	Course Description General principles of magnetohydrodynamics; theory of the expanding atmospheres; properties of solar wind, interaction of solar wind with the magneto-sphere of the Earth and other planets; bow shock and magnetotail, trapped particles, auroras.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Cross-listed dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-12
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☐	Dept (Home): Nuclear Engin & Radiolog Sci Subject: NERS Catalog: 575	Dept (Home): Nuclear Engin & Radiolog Sci Subject: NERS Catalog: 575
☑	☑ Course is Cross-Listed with Other Departments	☑ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
	Elec Engin & Computer Sci - EECS - 519	Elec & Comp Engin - ECE- 519
☐	Course Title (full title) Plasma Generation and Diagnostics Laboratory	Course Title (full title) Plasma Generation and Diagnostics Laboratory
☐	Abbreviated Title (20 char) Plasma Lab	Abbreviated Title (20 char) Plasma Lab
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Laboratory techniques for plasma ionization and diagnosis relevant to plasma processing, propulsion, vacuum electronics, and fusion. Plasma generation techniques includes: high voltage-DC, radio frequency, and e-beam discharges. Diagnostics include: Langmuir probes, microwave cavity perturbation, microwave interferometry, laser schlieren, and optical emission spectroscopy. Plasma parameters measured are: electron/ion density and electron temperature.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Nuclear Engin & Radiolog Sci Catalog: 575

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char) Preceded or accompanied by a course on electromagnetism.	Advisory Prerequisite (254 char) Preceded or accompanied by a course on electromagnetism.
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components
- ☑ Lecture
- ☐ Seminar
- ☐ Recitation
- ☑ Lab
- ☐ Discussion
- ☐ Independent Study

Graded Component
- ☑
- ☐
- ☐
- ☐
- ☐
- ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Ryan McBride Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email:Vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:	Achilleas Anastasopoulos	Print: Achilleas Anastasopoulos	Date: 7/20/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:	Todd Allen	Print: Todd R Allen	Date: 12 May 2023
Cross-Listed Department Chair:	Heath Hofmann	Print: Heath Hofmann	Date: 7/20/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Laboratory techniques for plasma ionization and diagnosis relevant to plasma processing, propulsion, vacuum electronics, and fusion. Plasma generation techniques includes: high voltage-DC, radio frequency, and e-beam discharges. Diagnostics include: Langmuir probes, microwave cavity perturbation, microwave interferometry, laser schlieren, and optical emission spectroscopy. Plasma parameters measured are: electron/ion density and electron temperature.	Course Description Laboratory techniques for plasma ionization and diagnosis relevant to plasma processing, propulsion, vacuum electronics, and fusion. Plasma generation techniques includes: high voltage-DC, radio frequency, and e-beam discharges. Diagnostics include: Langmuir probes, microwave cavity perturbation, microwave interferometry, laser schlieren, and optical emission spectroscopy. Plasma parameters measured are: electron/ion density and electron temperature.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab) 1	Contact hours (lab) 1

Additional Info:

Submitted by:
Cross-listed dept

Describe how this course fits with the degree requirements:
Laboratory elective in BSE and Graduate NERS programs.

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-24
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 520	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 520
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Solid State Physics	Course Title (full title) Solid State Physics
☐	Abbreviated Title (20 char) SOLID STATE PHYSICS	Abbreviated Title (20 char) SOLID STATE PHYSICS
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Crystal structure; Phonons; Introduction to Quantum Mechanics; Free electron Fermi gas; Low dimensional conductor; Electronic structure – Energy bands; Properties of semiconductors; Dielectrics response; Light absorption and emission; Magnetic effects; Superconductivity.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 520

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) Phys 453 or Graduate Standing	Advisory Prerequisite (254 char) Phys 453 or Graduate Standing
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☑ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Zhaohui Zhong Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/14/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/14/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Crystal structure; Phonons; Introduction to Quantum Mechanics; Free electron Fermi gas; Low dimensional conductor; Electronic structure – Energy bands; Properties of semiconductors; Dielectrics response; Light absorption and emission; Magnetic effects; Superconductivity.	Course Description Crystal structure; Phonons; Introduction to Quantum Mechanics; Free electron Fermi gas; Low dimensional conductor; Electronic structure – Energy bands; Properties of semiconductors; Dielectrics response; Light absorption and emission; Magnetic effects; Superconductivity.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation) 1	Contact hours (recitation) 1
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

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☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-24
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 521	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 521
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Solid State Devices	Course Title (full title) Solid State Devices
☐	Abbreviated Title (20 char) Solid State Devices	Abbreviated Title (20 char) Solid State Devices
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Physics of operation of three terminal device structures important for high frequency analog or high speed digital applications. Emphasis on proven field-effect and bipolar-junction transistors, also including current and speculative nanoelectronic devices. Detailed study of static current-voltage characteristics and models for small and large signal behavior.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 521

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 421	Advisory Prerequisite (254 char) EECS 421
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions
☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study Graded Component ☑ ☐ ☐ ☐ ☐ ☐ Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer	

Cognizant Faculty Member Name: Wei Lu Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/27/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/27/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Physics of operation of three terminal device structures important for high frequency analog or high speed digital applications. Emphasis on proven field-effect and bipolar-junction transistors, also including current and speculative nanoelectronic devices. Detailed study of static current-voltage characteristics and models for small and large signal behavior.	Course Description Physics of operation of three terminal device structures important for high frequency analog or high speed digital applications. Emphasis on proven field-effect and bipolar-junction transistors, also including current and speculative nanoelectronic devices. Detailed study of static current-voltage characteristics and models for small and large signal behavior.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Core Course

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-24
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 525	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 525
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Advanced Solid State Microwave Circuits	Course Title (full title) Advanced Solid State Microwave Circuits
☐	Abbreviated Title (20 char) Adv SS M-Wave Cir	Abbreviated Title (20 char) Adv SS M-Wave Cir
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) General properties and design of linear and nonlinear solid state microwave circuits including: amplifier gain blocks, low-noise, broadband and power amplifiers, oscillators, mixer and multiplier circuits, packaging, system implementation for wireless communication. Projects are overseen/graded by faculty and may also involve mentoring by representatives from external organizations.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student, Undergraduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 525

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☑	Advisory Prerequisite (254 char) EECS 411, EECS 421 or EECS 521.	Advisory Prerequisite (254 char) EECS 411, EECS 421 or ECE 521.
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Amir Mortazawi Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/24/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/24/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description General properties and design of linear and nonlinear solid state microwave circuits including: amplifier gain blocks, low-noise, broadband and power amplifiers, oscillators, mixer and multiplier circuits, packaging, system implementation for wireless communication. Projects are overseen/graded by faculty and may also involve mentoring by representatives from external organizations.	Course Description General properties and design of linear and nonlinear solid state microwave circuits including: amplifier gain blocks, low-noise, broadband and power amplifiers, oscillators, mixer and multiplier circuits, packaging, system implementation for wireless communication. Projects are overseen/graded by faculty and may also involve mentoring by representatives from external organizations.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-24
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 526	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 526
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Plasmonics	Course Title (full title) Plasmonics
☐	Abbreviated Title (20 char) Plasmonics	Abbreviated Title (20 char) Plasmonics
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) This is the study of optical phenomena related to the electromagnetic response of conductors. This course will provide basic knowledge to understand and apply principles of plasmonics. Students will be introduced to nanofabrication and characterization techniques. Optical, electronic, magnetic, thermal and biomedical applications of plasmonics will be discussed.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 526

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

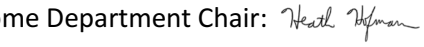
	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char) EECS 230, Physics 240, graduate standing or permission from the instructor	Advisory Prerequisite (254 char) EECS 230, Physics 240, graduate standing or permission from the instructor
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Somin Eunice Lee Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/24/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair: 		Print: Heath Hofmann	Date: 7/24/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description This is the study of optical phenomena related to the electromagnetic response of conductors. This course will provide basic knowledge to understand and apply principles of plasmonics. Students will be introduced to nanofabrication and characterization techniques. Optical, electronic, magnetic, thermal and biomedical applications of plasmonics will be discussed.	Course Description This is the study of optical phenomena related to the electromagnetic response of conductors. This course will provide basic knowledge to understand and apply principles of plasmonics. Students will be introduced to nanofabrication and characterization techniques. Optical, electronic, magnetic, thermal and biomedical applications of plasmonics will be discussed.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:
Laboratory time in the LNF is requested as part of the course. In Fall 2015, nanofabrication and characterization tools for plasmonics research were surveyed. This included SEM, E-beam, Nano-imprint lithography and an LNF tour. These topics complemented the existing lecture portions of the course. Student surveys unanimously supported laboratory time in the future.Further, the student backgrounds are diverse (ECE, chemistry, chemical engineering, physics, mechanical engineering, biomedical engineering). Thus, for many students, it was the first time to see the LNF and the facilities and equipment available for plasmonics research according to surveys.

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

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☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-06-23
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 528	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 528
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Principles of Microelectronics Process Technology	Course Title (full title) Principles of Microelectronics Process Technology
☐	Abbreviated Title (20 char) M-Elec Proc Tech	Abbreviated Title (20 char) M-Elec Proc Tech
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Theoretical analysis of the chemistry and physics of process technologies used in micro-electronics fabrication. Topics include: semiconductor growth, material characterization, lithography tools, photo-resist models, thin film deposition, chemical etching, plasma etching, electrical contact formation, micro-structure processing and process modeling.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 528

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 421 and EECS 423	Advisory Prerequisite (254 char) EECS 421 and EECS 423
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☐ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Jerzy Kanicki Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/14/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/14/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Theoretical analysis of the chemistry and physics of process technologies used in micro-electronics fabrication. Topics include: semiconductor growth, material characterization, lithography tools, photo-resist models, thin film deposition, chemical etching, plasma etching, electrical contact formation, micro-structure processing and process modeling.	Course Description Theoretical analysis of the chemistry and physics of process technologies used in micro-electronics fabrication. Topics include: semiconductor growth, material characterization, lithography tools, photo-resist models, thin film deposition, chemical etching, plasma etching, electrical contact formation, micro-structure processing and process modeling.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

1210 LSA Building
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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-06-23
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 529	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 529
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Semiconductor Lasers and LEDs	Course Title (full title) Semiconductor Lasers and LEDs
☐	Abbreviated Title (20 char) Semi Las & Leds	Abbreviated Title (20 char) Semi Las & Leds
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Optical processes in semiconductors, spontaneous emission, absorption gain, stimulated emission. Principles of light-emitting diodes, including transient effects, spectral and spatial radiation fields. Principles of semiconducting lasers; gain-current relationships, radiation fields, optical confinement and transient effects.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 529

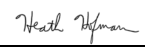
☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char) EECS 429	Advisory Prerequisite (254 char) EECS 429
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions
☐	Course Components / Graded Component ☑ Lecture ☑ ☐ Seminar ☐ ☐ Recitation ☐ ☐ Lab ☐ ☐ Discussion ☐ ☐ Independent Study ☐ Terms Typically Offered ☑ Fall ☐ Winter ☐ Spring ☐ Summer ☐ Spring/Summer	

Cognizant Faculty Member Name: Pallab Bhattacharya Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/20/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/20/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Optical processes in semiconductors, spontaneous emission, absorption gain, stimulated emission. Principles of light-emitting diodes, including transient effects, spectral and spatial radiation fields. Principles of semiconducting lasers; gain-current relationships, radiation fields, optical confinement and transient effects.	Course Description Optical processes in semiconductors, spontaneous emission, absorption gain, stimulated emission. Principles of light-emitting diodes, including transient effects, spectral and spatial radiation fields. Principles of semiconducting lasers; gain-current relationships, radiation fields, optical confinement and transient effects.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-06-26
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 531	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 531
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Antenna Theory & Design	Course Title (full title) Antenna Theory & Design
☐	Abbreviated Title (20 char) Antenna Thry&Des	Abbreviated Title (20 char) Antenna Thry&Des
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Theory of transmitting and receiving antennas. Reciprocity. Wire antennas: dipoles, loops and traveling-wave antennas. Analysis and synthesis of linear arrays. Phased arrays. Input impedance and method of moments. Mutual impedance. Aperture antennas: slot, Babinet's principle. Microstrip antennas. Horns, reflector and lens antennas.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 531

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 330	Advisory Prerequisite (254 char) EECS 330
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☐ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Leung Tsang Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/21/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/21/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Theory of transmitting and receiving antennas. Reciprocity. Wire antennas: dipoles, loops and traveling-wave antennas. Analysis and synthesis of linear arrays. Phased arrays. Input impedance and method of moments. Mutual impedance. Aperture antennas: slot, Babinet's principle. Microstrip antennas. Horns, reflector and lens antennas.	Course Description Theory of transmitting and receiving antennas. Reciprocity. Wire antennas: dipoles, loops and traveling-wave antennas. Analysis and synthesis of linear arrays. Phased arrays. Input impedance and method of moments. Mutual impedance. Aperture antennas: slot, Babinet's principle. Microstrip antennas. Horns, reflector and lens antennas.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-06-26
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 533	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 533
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Microwave Measurements Laboratory	Course Title (full title) Microwave Measurements Laboratory
☐	Abbreviated Title (20 char) Mw Meas Lab	Abbreviated Title (20 char) Mw Meas Lab
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Advanced topics in microwave measurements: power spectrum and noise measurement, introduction to state-of-the-art microwave test equipment, methods for measuring the dielectric constant of materials, polarimetric radar cross section measurements, near field antenna pattern measurements, electromagnetic emission measurement (EM compatibility). Followed by a project that will include design, analysis, and construction of a microwave subsystem.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 533

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 320 and graduate standing	Advisory Prerequisite (254 char) EECS 320 and graduate standing
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☑ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☐ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Kamal Sarabandi Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/14/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/14/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Advanced topics in microwave measurements: power spectrum and noise measurement, introduction to state-of-the-art microwave test equipment, methods for measuring the dielectric constant of materials, polarimetric radar cross section measurements, near field antenna pattern measurements, electromagnetic emission measurement (EM compatibility). Followed by a project that will include design, analysis, and construction of a microwave subsystem.	Course Description Advanced topics in microwave measurements: power spectrum and noise measurement, introduction to state-of-the-art microwave test equipment, methods for measuring the dielectric constant of materials, polarimetric radar cross section measurements, near field antenna pattern measurements, electromagnetic emission measurement (EM compatibility). Followed by a project that will include design, analysis, and construction of a microwave subsystem.
Class Length Full term	Class Length Full term
Contact hours (lecture): 2	Contact hours (lecture): 2
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab) 1	Contact hours (lab) 1

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-24
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 534	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 534
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Analysis of Electric Power Distribution Systems and Loads	Course Title (full title) Analysis of Electric Power Distribution Systems and Loads
☐	Abbreviated Title (20 char) Distribution Systems	Abbreviated Title (20 char) Distribution Systems
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) This course covers the fundamentals of electric power distribution systems and electric loads, including distribution grid components, topologies, and operational strategies; three-phase unbalanced power flow; electric load modeling, analysis, and control; and emerging topics such as photovoltaic and electric vehicle interconnection, distribution automation, and advanced metering infrastructure.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 534

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 463 or Graduate Standing	Advisory Prerequisite (254 char) EECS 463 or Graduate Standing
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions
☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study Graded Component ☑ ☐ ☐ ☐ ☐ ☐ Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer	

Cognizant Faculty Member Name: Johanna Mathieu Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:	A. Anastasopoulos	Print: Achilleas Anastasopoulos	Date: 7/14/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:	Heath Hofmann	Print: Heath Hofmann	Date: 7/14/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description This course covers the fundamentals of electric power distribution systems and electric loads, including distribution grid components, topologies, and operational strategies; three-phase unbalanced power flow; electric load modeling, analysis, and control; and emerging topics such as photovoltaic and electric vehicle interconnection, distribution automation, and advanced metering infrastructure.	Course Description This course covers the fundamentals of electric power distribution systems and electric loads, including distribution grid components, topologies, and operational strategies; three-phase unbalanced power flow; electric load modeling, analysis, and control; and emerging topics such as photovoltaic and electric vehicle interconnection, distribution automation, and advanced metering infrastructure.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-24
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING			**REQUESTED LISTING**		
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 535			Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 535		
☐	☐ Course is Cross-Listed with Other Departments			☐ Course is Cross-Listed with Other Departments		
☐	Department	Subject	Catalog Number	Department	Subject	Catalog Number
☐	Course Title (full title) Power System Dynamics and Control			Course Title (full title) Power System Dynamics and Control		
☐	Abbreviated Title (20 char) Pwr Sys Dyn&Control			Abbreviated Title (20 char) Pwr Sys Dyn&Control		
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) The course introduces angle and voltage stability concepts and considers control strategies for improving dynamic performance. It provides an overview of nonlinear dynamical systems, Lyapunov methods and bifurcation analysis. Models of dynamical devices are developed. Small disturbance (linear) analysis techniques are presented, along with methods for assessing large disturbance (nonlinear) behavior.					
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3			Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:		
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student					
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:			☐ Course is Y graded ☐ Can be taken more than once in the same term		

Subject: Elec Engin & Computer Sci Catalog: 535

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 463, or permission of instructor or Graduate Instructor	Advisory Prerequisite (254 char) EECS 463, or permission of instructor or Graduate Instructor
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Ian Hiskens Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/21/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/21/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description The course introduces angle and voltage stability concepts and considers control strategies for improving dynamic performance. It provides an overview of nonlinear dynamical systems, Lyapunov methods and bifurcation analysis. Models of dynamical devices are developed. Small disturbance (linear) analysis techniques are presented, along with methods for assessing large disturbance (nonlinear) behavior.	Course Description The course introduces angle and voltage stability concepts and considers control strategies for improving dynamic performance. It provides an overview of nonlinear dynamical systems, Lyapunov methods and bifurcation analysis. Models of dynamical devices are developed. Small disturbance (linear) analysis techniques are presented, along with methods for assessing large disturbance (nonlinear) behavior.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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ro.curriculum@umich.edu
ro.umich.edu

Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-24
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 536	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 536
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Power System Markets & Optimization	Course Title (full title) Power System Markets & Optimization
☐	Abbreviated Title (20 char) Power Markets	Abbreviated Title (20 char) Power Markets
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) This course covers the fundamentals of electric power system markets, including the economic principles they are based upon. It also covers the optimization methods required to solve planning and operational problems including economic dispatch, optimal power flow, and unit commitment. Problems are placed in the context of real electricity markets.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 536

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
☐	Enforced Prerequisite (254 char) EECS 463; (C or better, No OP/F) or Graduate Standing Minimum grade requirement: C	Enforced Prerequisite (254 char) EECS 463; (C or better, No OP/F) or Graduate Standing Minimum grade requirement: C
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Johanna Mathieu Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/14/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/14/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description This course covers the fundamentals of electric power system markets, including the economic principles they are based upon. It also covers the optimization methods required to solve planning and operational problems including economic dispatch, optimal power flow, and unit commitment. Problems are placed in the context of real electricity markets.	Course Description This course covers the fundamentals of electric power system markets, including the economic principles they are based upon. It also covers the optimization methods required to solve planning and operational problems including economic dispatch, optimal power flow, and unit commitment. Problems are placed in the context of real electricity markets.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

Course Approval Request Form

Office of the Registrar, University of Michigan

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☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-06-26
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 538	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 538
☐	☑ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number Applied Physics - APPPHYS - 550, Physics - PHYSICS - 650	☑ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number Applied Physics - APPPHYS - 550, Physics - PHYSICS - 650
☐	Course Title (full title) Optical Waves in Crystals	Course Title (full title) Optical Waves in Crystals
☐	Abbreviated Title (20 char) Opt Wave Crystals	Abbreviated Title (20 char) Opt Wave Crystals
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Propagation of laser beams: Gaussian wave optics and the ABCD law. Manipulation of light by electrical, acoustical waves; crystal properties and the dielectric tensor; electro-optic, acousto-optic effects and devices. Introduction to nonlinear optics; harmonic generation, optical rectification, four-wave mixing, self-focusing and self-phase modulation.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 538

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

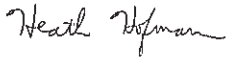
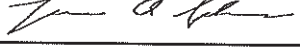
	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char) EECS 434 and Graduate standing	Advisory Prerequisite (254 char) EECS 434 and Graduate standing
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☐ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Herbert Winful Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/14/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/14/23
Cross-Listed Department Chair:		Print: Cagliyan Kurdak	Date: 8/14/23
Cross-Listed Department Chair:		Print: Tom Schwarz (Physics)	Date: 8/11/23
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:

Course Description
Propagation of laser beams: Gaussian wave optics and the ABCD law. Manipulation of light by electrical, acoustical waves; crystal properties and the dielectric tensor; electro-optic, acousto-optic effects and devices. Introduction to nonlinear optics; harmonic generation, optical rectification, four-wave mixing, self-focusing and self-phase modulation.

Class Length
Full term

Contact hours (lecture):
3

Contact hours (recitation)

Contact hours (lab)

Requested:

Course Description
Propagation of laser beams: Gaussian wave optics and the ABCD law. Manipulation of light by electrical, acoustical waves; crystal properties and the dielectric tensor; electro-optic, acousto-optic effects and devices. Introduction to nonlinear optics; harmonic generation, optical rectification, four-wave mixing, self-focusing and self-phase modulation.

Class Length
Full term

Contact hours (lecture):
3

Contact hours (recitation)

Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested

☐ New Course
☑ Modification of Existing Course
☐ Deletion of Existing Course

Date of Submission: 2023-06-21
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 539	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 539
☐	☑ Course is Cross-Listed with Other Departments	☑ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number: Applied Physics - APPPHYS - 551, Physics - PHYSICS - 651	Department / Subject / Catalog Number: Applied Physics - APPPHYS - 551, Physics - PHYSICS - 651
☐	Course Title (full title) Lasers	Course Title (full title) Lasers
☐	Abbreviated Title (20 char) Lasers	Abbreviated Title (20 char) Lasers
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Complete study of laser operation: the atom-field interaction; homogeneous and inhomogeneous broadening mechanisms; atomic rate equations; gain and saturation; laser oscillation; laser resonators, modes, and cavity equations; cavity modes; laser dynamics, Q-switching and modelocking. Special topics such as femto-seconds lasers and ultrahigh power lasers.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 539

☐ Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☑	Advisory Prerequisite (254 char) EECS 537 or 538 and Graduate standing.	Advisory Prerequisite (254 char) ECE 537 or 538 and Graduate standing.
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐ Course Components

	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☐ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Almantas Galvanauskas Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email:vyas@umich.edu Phone:647-1754

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/14/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:	Heath Hofmann	Print: Heath Hofmann	Date: 7/14/23
Cross-Listed Department Chair:		Print: Gagliyan Kurdak	Date: 8/14/23
Cross-Listed Department Chair:		Print: Tom Schwarz (Physics)	Date: 8/11/23
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:

Course Description
Complete study of laser operation: the atom-field interaction; homogeneous and inhomogeneous broadening mechanisms; atomic rate equations; gain and saturation; laser oscillation; laser resonators, modes, and cavity equations; cavity modes; laser dynamics, Q-switching and modelocking. Special topics such as femto-seconds lasers and ultrahigh power lasers.

Class Length
Full term

Contact hours (lecture):
3

Contact hours (recitation)

Contact hours (lab)

Requested:

Course Description
Complete study of laser operation: the atom-field interaction; homogeneous and inhomogeneous broadening mechanisms; atomic rate equations; gain and saturation; laser oscillation; laser resonators, modes, and cavity equations; cavity modes; laser dynamics, Q-switching and modelocking. Special topics such as femto-seconds lasers and ultrahigh power lasers.

Class Length
Full term

Contact hours (lecture):
3

Contact hours (recitation)

Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

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☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-24
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 544	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 544
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Analysis of Societal Networks	Course Title (full title) Analysis of Societal Networks
☐	Abbreviated Title (20 char) Anlys Soc Networks	Abbreviated Title (20 char) Anlys Soc Networks
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) In the modern world we depend on the efficiency of a myriad of societal networks to transact many activities. This course analyzes them (how they are connected, how they form, and how processes and transactions occur on them) using mathematical tools from graph theory, linear algebra, probability and game theory.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 544

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

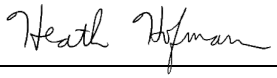
	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 301 or MATH 425 or STATS 425, or graduate standing and C or better	Advisory Prerequisite (254 char) EECS 301 or MATH 425 or STATS 425, or graduate standing and C or better
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions EECS 203 and (MATH 214 or EECS 453)	Credit Exclusions EECS 203 and (MATH 214 or EECS 453)

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Vijay Subramanian Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:	Print: Achilleas Anastasopoulos	Date: 8/3/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: 	Print: Heath Hofmann	Date: 8/3/23
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description In the modern world we depend on the efficiency of a myriad of societal networks to transact many activities. Course analyzes them (how they are connected, how they form, and how processes and transactions occur on them) using mathematical tools from graph theory, linear algebra, probability and game theory.	Course Description In the modern world we depend on the efficiency of a myriad of societal networks to transact many activities. Course analyzes them (how they are connected, how they form, and how processes and transactions occur on them) using mathematical tools from graph theory, linear algebra, probability and game theory.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-24
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 550	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 550
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Information Theory	Course Title (full title) Information Theory
☐	Abbreviated Title (20 char) Informatn Theory	Abbreviated Title (20 char) Informatn Theory
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Measures of information, such as entropy, conditional entropy, mutual and directed information and Kullback-Leibler divergence; fundamental limits to the performance of communication systems, including source coding (data compression) and channel coding (reliable transmission through noisy media); elementary source and channel coding techniques; information theoretic bounds to the performance of estimation/decision systems.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 550

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☑	Advisory Prerequisite (254 char) EECS 501	Advisory Prerequisite (254 char) ECE 501
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions
☐	Course Components / Graded Component ☑ Lecture ☑ ☐ Seminar ☐ ☐ Recitation ☐ ☐ Lab ☐ ☐ Discussion ☐ ☐ Independent Study ☐ Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer	

Cognizant Faculty Member Name: Sandeep Pradhan Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:	Print: Achilleas Anastasopoulos	Date: 7/22/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair:	Print: Heath Hofmann	Date: 7/22/23
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Measures of information, such as entropy, conditional entropy, mutual and directed information and Kullback-Leibler divergence; fundamental limits to the performance of communication systems, including source coding (data compression) and channel coding (reliable transmission through noisy media); elementary source and channel coding techniques; information theoretic bounds to the performance of estimation/decision systems.	Course Description Measures of information, such as entropy, conditional entropy, mutual and directed information and Kullback-Leibler divergence; fundamental limits to the performance of communication systems, including source coding (data compression) and channel coding (reliable transmission through noisy media); elementary source and channel coding techniques; information theoretic bounds to the performance of estimation/decision systems.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Other

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-25
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 551	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 551
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Matrix Methods for Signal Processing, Data Analysis and Machine Learning	Course Title (full title) Matrix Methods for Signal Processing, Data Analysis and Machine Learning
☐	Abbreviated Title (20 char) Matrix Meth Sig Proc	Abbreviated Title (20 char) Matrix Meth Sig Proc
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Theory and application of matrix methods to signal processing, data analysis and machine learning. Theoretical topics include subspaces, engenvalue and singular value decomposition, projection theorem, constrained, regularized and unconstrained least squares techniques and iterative algorithms. Applications such as image deblurring, ranking of webpages, image segmentation and compression, social networks, circuit analysis, recommender systems and handwritten digit recognition. Applications and theory are covered in greater depth than in EECS 453.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 551

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

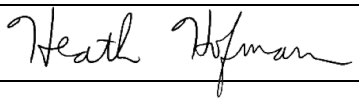
	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char) EECS 351 and (C or better) or Graduate Standing	Advisory Prerequisite (254 char) EECS 351 and (C or better) or Graduate Standing
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☑	Credit Exclusions Students cannot earn credit for both EECS 505 and EECS 551.	Credit Exclusions Students cannot earn credit for both ECE 505 and ECE 551.

	Course Components	Graded Component	Terms Typically Offered
☐	☑ Lecture	☑	☑ Fall
	☐ Seminar	☐	☐ Winter
	☐ Recitation	☐	☐ Spring
	☐ Lab	☐	☐ Summer
	☑ Discussion	☐	☐ Spring/Summer
	☐ Independent Study	☐	

Cognizant Faculty Member Name: Jeffrey Fessler Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/25/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/25/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Theory and application of matrix methods to signal processing, data analysis and machine learning. Theoretical topics include subspaces, engenvalue and singular value decomposition, projection theorem, constrained, regularized and unconstrained least squares techniques and iterative algorithms. Applications such as image deblurring, ranking of webpages, image segmentation and compression, social networks, circuit analysis, recommender systems and handwritten digit recognition. Applications and theory are covered in greater depth than in EECS 453.	Course Description Theory and application of matrix methods to signal processing, data analysis and machine learning. Theoretical topics include subspaces, engenvalue and singular value decomposition, projection theorem, constrained, regularized and unconstrained least squares techniques and iterative algorithms. Applications such as image deblurring, ranking of webpages, image segmentation and compression, social networks, circuit analysis, recommender systems and handwritten digit recognition. Applications and theory are covered in greater depth than in EECS 453.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation) 1	Contact hours (recitation) 1
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

1210 LSA Building
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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-24
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 554	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 554
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Introduction to Digital Communication and Coding	Course Title (full title) Introduction to Digital Communication and Coding
☐	Abbreviated Title (20 char) Dig Comm&Codes	Abbreviated Title (20 char) Dig Comm&Codes
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Digital transmission of information across discrete and analog channels. Sampling; quantization; noiseless source codes for data compression: Huffman's algorithm and entropy; block and convolutional channel codes for error correction; channel capacity; digital modulation methods: PSK, MSK, FSK, QAM; matched filter recievers. Performance analysis: power, bandwidth, data rate and error probability.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Students	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 554

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 216 and EECS 301	Advisory Prerequisite (254 char) EECS 216 and EECS 301
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components / Graded Component

☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Achilleas Anastasopoulos Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/22/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair: Heath Hofmann		Print: Heath Hofmann	Date: 7/22/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Digital transmission of information across discrete and analog channels. Sampling; quantization; noiseless source codes for data compression: Huffman's algorithm and entropy; block and convolutional channel codes for error correction; channel capacity; digital modulation methods: PSK, MSK, FSK, QAM; matched filter recievers. Performance analysis: power, bandwidth, data rate and error probability.	Course Description Digital transmission of information across discrete and analog channels. Sampling; quantization; noiseless source codes for data compression: Huffman's algorithm and entropy; block and convolutional channel codes for error correction; channel capacity; digital modulation methods: PSK, MSK, FSK, QAM; matched filter recievers. Performance analysis: power, bandwidth, data rate and error probability.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-06-26
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 555	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 555
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Digital Communication Theory	Course Title (full title) Digital Communication Theory
☐	Abbreviated Title (20 char) Digital Comm Thry	Abbreviated Title (20 char) Digital Comm Thry
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Theory of digital modulation and coding. Optimum receivers in Gaussian noise. Signal space and decision theory. Signal design. Bandwidth and dimensionality. Fundamental limits in coding and modulation. Capacity and cutoff rate. Block, convolutional and trellis coding. Continuous phase modulation. Filtered channels and intersymbol interference. Equalization. Spread-spectrum. Fading channels. Current topics.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 555

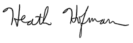
☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☑	Advisory Prerequisite (254 char) EECS 501 and EECS 554	Advisory Prerequisite (254 char) ECE 501 and ECE 554
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions
☐	Course Components / Graded Component ☑ Lecture ☑ ☐ Seminar ☐ ☐ Recitation ☐ ☐ Lab ☐ ☐ Discussion ☐ ☐ Independent Study ☐ Terms Typically Offered ☐ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer	

Cognizant Faculty Member Name: Wayne Stark Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/19/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/19/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Theory of digital modulation and coding. Optimum receivers in Gaussian noise. Signal space and decision theory. Signal design. Bandwidth and dimensionality. Fundamental limits in coding and modulation. Capacity and cutoff rate. Block, convolutional and trellis coding. Continuous phase modulation. Filtered channels and intersymbol interference. Equalization. Spread-spectrum. Fading channels. Current topics.	Course Description Theory of digital modulation and coding. Optimum receivers in Gaussian noise. Signal space and decision theory. Signal design. Bandwidth and dimensionality. Fundamental limits in coding and modulation. Capacity and cutoff rate. Block, convolutional and trellis coding. Continuous phase modulation. Filtered channels and intersymbol interference. Equalization. Spread-spectrum. Fading channels. Current topics.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-25
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 556	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 556
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Image Processing	Course Title (full title) Image Processing
☐	Abbreviated Title (20 char) Image Processing	Abbreviated Title (20 char) Image Processing
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Sampling, filtering, 2D Fourier transforms, interpolation, edge detection, enhancement, denoising, restoration, segmentation, random field models of images, Bayesian methods, wavelets and sparsity models. Applications include optical imaging, biomedical images, video and image compression. Student projects based on recent image processing literature. Projects are overseen/graded by faculty and may also involve mentoring by representatives from external organizations.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 556

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☑	Advisory Prerequisite (254 char) EECS 501, Corequisite: (EECS 453 or EECS 551)	Advisory Prerequisite (254 char) ECE 501, Corequisite: (EECS 453 or ECE 551)
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions
☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study Graded Component ☑ ☐ ☐ ☐ ☐ ☐ Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer	
Cognizant Faculty Member Name: Jeffrey Fessler		Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:	Print: Achilleas Anastasopoulos	Date: 7/25/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair:	Print: Heath Hofmann	Date: 7/25/23
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Sampling, filtering, 2D Fourier transforms, interpolation, edge detection, enhancement, denoising, restoration, segmentation, random field models of images, Bayesian methods, wavelets and sparsity models. Applications include optical imaging, biomedical images, video and image compression. Student projects based on recent image processing literature. Projects are overseen/graded by faculty and may also involve mentoring by representatives from external organizations.	Course Description Sampling, filtering, 2D Fourier transforms, interpolation, edge detection, enhancement, denoising, restoration, segmentation, random field models of images, Bayesian methods, wavelets and sparsity models. Applications include optical imaging, biomedical images, video and image compression. Student projects based on recent image processing literature. Projects are overseen/graded by faculty and may also involve mentoring by representatives from external organizations.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-25
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 557	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 557
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Communication Networks	Course Title (full title) Communication Networks
☐	Abbreviated Title (20 char) Communication Net	Abbreviated Title (20 char) Communication Net
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) System architectures. Data link control: error correction, protocol analysis, framing. Message delay: Markov processes, queuing, delays in statistical multiplexing, multiple users with reservations, limited service, priorities. Network delay: Kleinrock independence, reversibility, traffic flows, throughput analysis, Jackson networks. Multiple access networks: ALOHA and splitting protocols, carrier sensing, multi-access reservations.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 557

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

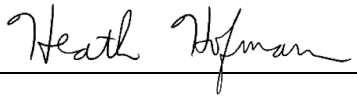
	CURRENT LISTING	**REQUESTED LISTING**
☑	Advisory Prerequisite (254 char) Graduate standing, preceded by EECS 431 or accompanied by EECS 501	Advisory Prerequisite (254 char) Graduate standing, preceded by EECS 431 or accompanied by ECE 501
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Lei Ying Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:	Print: Achilleas Anastasopoulos	Date: 7/25/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: 	Print: Heath Hofmann	Date: 7/25/23
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description System architectures. Data link control: error correction, protocol analysis, framing. Message delay: Markov processes, queuing, delays in statistical multiplexing, multiple users with reservations, limited service, priorities. Network delay: Kleinrock independence, reversibility, traffic flows, throughput analysis, Jackson networks. Multiple access networks: ALOHA and splitting protocols, carrier sensing, multi-access reservations.	Course Description System architectures. Data link control: error correction, protocol analysis, framing. Message delay: Markov processes, queuing, delays in statistical multiplexing, multiple users with reservations, limited service, priorities. Network delay: Kleinrock independence, reversibility, traffic flows, throughput analysis, Jackson networks. Multiple access networks: ALOHA and splitting protocols, carrier sensing, multi-access reservations.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-06-27
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 558	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 558
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Stochastic Control	Course Title (full title) Stochastic Control
☐	Abbreviated Title (20 char) Stochastic Contrl	Abbreviated Title (20 char) Stochastic Contrl
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Analysis and optimization of controlled stochastic systems. Models: linear and nonlinear stochastic controlled systems, controlled Markov chains. Optimization of systems described by Markov processes; dynamic programming under perfect and imperfect information, finite and infinite horizons. System identification: off-line, recursive. Stochastic adaptive control: Markov chains, self-tuning regulators, bandit problems.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 558

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☑	Advisory Prerequisite (254 char) EECS 501 and EECS 560	Advisory Prerequisite (254 char) ECE 501 and ECE 560
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☐ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Achilleas Anastasopoulos Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date:
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Analysis and optimization of controlled stochastic systems. Models: linear and nonlinear stochastic controlled systems, controlled Markov chains. Optimization of systems described by Markov processes; dynamic programming under perfect and imperfect information, finite and infinite horizons. System identification: off-line, recursive. Stochastic adaptive control: Markov chains, self-tuning regulators, bandit problems.	Course Description Analysis and optimization of controlled stochastic systems. Models: linear and nonlinear stochastic controlled systems, controlled Markov chains. Optimization of systems described by Markov processes; dynamic programming under perfect and imperfect information, finite and infinite horizons. System identification: off-line, recursive. Stochastic adaptive control: Markov chains, self-tuning regulators, bandit problems.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

1210 LSA Building
500 S. State Street
Ann Arbor, MI 48109-1382
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Fax: 734.936.3148
ro.curriculum@umich.edu
ro.umich.edu

Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-23
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 559	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 559
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Optimization Methods in Signal Processing and Machine Learning	Course Title (full title) Optimization Methods in Signal Processing and Machine Learning
☐	Abbreviated Title (20 char) Optim in Sig Pro ML	Abbreviated Title (20 char) Optim in Sig Pro ML
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Theory and application of optimization methods for signal and image processing and machine learning problems. Algorithms include gradient-based methods, proximal methods, and duality-based methods. Applications include signal denoising, compressed sensing, matrix completion, robust regression, and classifier design.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 559

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☑	Advisory Prerequisite (254 char) EECS 551 or 505	Advisory Prerequisite (254 char) ECE 551 or 505
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Qing Qu Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/19/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/19/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Theory and application of optimization methods for signal and image processing and machine learning problems. Algorithms include gradient-based methods, proximal methods, and duality-based methods. Applications include signal denoising, compressed sensing, matrix completion, robust regression, and classifier design.	Course Description Theory and application of optimization methods for signal and image processing and machine learning problems. Algorithms include gradient-based methods, proximal methods, and duality-based methods. Applications include signal denoising, compressed sensing, matrix completion, robust regression, and classifier design.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
This course will count as a major area course for SIMPL majors.

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-12
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☐	Dept (Home): Mechanical Engineering Subject: MECHENG Catalog: 561	Dept (Home): Mechanical Engineering Subject: MECHENG Catalog: 561
☑	☑ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number Elec Eng & Comp Sci - EECS - 561	☑ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number Elec & Comp Eng - ECE -561
☐	Course Title (full title) Design of Digital Control Systems	Course Title (full title) Design of Digital Control Systems
☐	Abbreviated Title (20 char) Des Dig Cont Sys	Abbreviated Title (20 char) Des Dig Cont Sys
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Sampling and data reconstruction. Z-transforms and state variable descriptions of discrete-time systems. Modeling and identification. Analysis and design using root locus, frequency response, and state space techniques. Linear quadratic optimal control and state estimation. Quantization and other nonlinearities.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Mechanical Engineering Catalog: 561

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char) EECS 460 or ME461	Advisory Prerequisite (254 char) EECS 460 or ME461
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

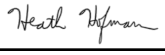
Course Components / Graded Component
- ☑ Lecture ☑
- ☐ Seminar ☐
- ☐ Recitation ☐
- ☐ Lab ☐
- ☐ Discussion ☐
- ☐ Independent Study ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Ram Vasudevan Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/21/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Kazuhiro Saitou	Date: 5/13/2023
Cross-Listed Department Chair:		Print: Heath Hofmann	Date: 7/21/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Sampling and data reconstruction. Z-transforms and state variable descriptions of discrete-time systems. Modeling and identification. Analysis and design using root locus, frequency response, and state space techniques. Linear quadratic optimal control and state estimation. Quantization and other nonlinearities.	Course Description Sampling and data reconstruction. Z-transforms and state variable descriptions of discrete-time systems. Modeling and identification. Analysis and design using root locus, frequency response, and state space techniques. Linear quadratic optimal control and state estimation. Quantization and other nonlinearities.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Cross-listed dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

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☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-23
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 563	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 563
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Hybrid Systems Analysis and Control	Course Title (full title) Hybrid Systems Analysis and Control
☐	Abbreviated Title (20 char) Hybrid Control	Abbreviated Title (20 char) Hybrid Control
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Introduction to analysis and design of hybrid systems and hybrid control systems. Hybrid system modeling formalisms, specifications (automata theory, temporal logics), verification (barrier certificates, reachable sets, abstraction-based methods) and control synthesis. Stability of switched/hybrid systems. Applications of convex geometry and convex optimization in control. Model-predictive control of hybrid systems.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 563

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☑	Advisory Prerequisite (254 char) (EECS 562) or (EECS 560 and permission of instructor)	Advisory Prerequisite (254 char) (ECE 562) or (ECE 560 and permission of instructor)
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Necmiye Ozay Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/19/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/19/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Introduction to analysis and design of hybrid systems and hybrid control systems. Hybrid system modeling formalisms, specifications (automata theory, temporal logics), verification (barrier certificates, reachable sets, abstraction-based methods) and control synthesis. Stability of switched/hybrid systems. Applications of convex geometry and convex optimization in control. Model-predictive control of hybrid systems.	Course Description Introduction to analysis and design of hybrid systems and hybrid control systems. Hybrid system modeling formalisms, specifications (automata theory, temporal logics), verification (barrier certificates, reachable sets, abstraction-based methods) and control synthesis. Stability of switched/hybrid systems. Applications of convex geometry and convex optimization in control. Model-predictive control of hybrid systems.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:
Two lectures are held in CAEN computer labs to introduce students to hybrid system verification/synthesis software. All of the software used is open-source and preinstalled to CAEN machines by DCO within a course module.

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-22
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 564	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 564
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Estimation, Filtering, and Detection	Course Title (full title) Estimation, Filtering, and Detection
☐	Abbreviated Title (20 char) Estim,Filter&Detect	Abbreviated Title (20 char) Estim,Filter&Detect
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Principles of estimation, linear filtering and detection. Estimation: linear and nonlinear minimum mean squared error estimation, and other strategies. Linear filtering: Wiener and Kalman filtering. Detection: simple, composite, binary and multiple hypotheses. Neyman-Pearson and Bayesian approaches.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student, Undergraduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 564

☐ Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☑	Advisory Prerequisite (254 char) EECS 501	Advisory Prerequisite (254 char) ECE 501
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components
- ☑ Lecture
- ☐ Seminar
- ☐ Recitation
- ☐ Lab
- ☐ Discussion
- ☐ Independent Study

Graded Component
- ☑
- ☐
- ☐
- ☐
- ☐
- ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Alfred Hero Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/22/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/22/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Principles of estimation, linear filtering and detection. Estimation: linear and nonlinear minimum mean squared error estimation, and other strategies. Linear filtering: Wiener and Kalman filtering. Detection: simple, composite, binary and multiple hypotheses. Neyman-Pearson and Bayesian approaches.	Course Description Principles of estimation, linear filtering and detection. Estimation: linear and nonlinear minimum mean squared error estimation, and other strategies. Linear filtering: Wiener and Kalman filtering. Detection: simple, composite, binary and multiple hypotheses. Neyman-Pearson and Bayesian approaches.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-24
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 565	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 565
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Linear Feedback Control Systems	Course Title (full title) Linear Feedback Control Systems
☐	Abbreviated Title (20 char) Lin Feedback Control	Abbreviated Title (20 char) Lin Feedback Control
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Control design concepts for linear multivariable systems. Review of single variable systems and extensions to multivariable systems. Purpose of feedback. Sensitivity, robustness, and design trade-offs. Design formulations using both frequency domain and state space descriptions. Pole placement/observer design. Linear quadratic Guassian based design methods. Design problems unique to multivariable systems	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 565

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☑	Advisory Prerequisite (254 char) EECS 460 or Aero 348 or ME 461 and Aero 550 (EECS 560)	Advisory Prerequisite (254 char) EECS 460 or Aero 348 or ME 461 and Aero 550 (ECE 560)
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☑	Credit Exclusions credit for EECS 565 and Aero 580 not allowed	Credit Exclusions credit for ECE 565 and Aero 580 not allowed
☐	Course Components / Graded Component ☑ Lecture ☑ ☐ Seminar ☐ ☐ Recitation ☐ ☐ Lab ☐ ☐ Discussion ☐ ☐ Independent Study ☐ Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer	

Cognizant Faculty Member Name: James Freudenberg Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:	Print: Achilleas Anastasopoulos	Date: 7/24/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair:	Print: Heath Hofmann	Date: 7/24/23
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Control design concepts for linear multivariable systems. Review of single variable systems and extensions to multivariable systems. Purpose of feedback. Sensitivity, robustness, and design trade-offs. Design formulations using both frequency domain and state space descriptions. Pole placement/observer design. Linear quadratic Guassian based design methods. Design problems unique to multivariable systems.	Course Description Control design concepts for linear multivariable systems. Review of single variable systems and extensions to multivariable systems. Purpose of feedback. Sensitivity, robustness, and design trade-offs. Design formulations using both frequency domain and state space descriptions. Pole placement/observer design. Linear quadratic Guassian based design methods. Design problems unique to multivariable systems
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-22
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 566	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 566
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Discrete Event Systems	Course Title (full title) Discrete Event Systems
☐	Abbreviated Title (20 char) Discrete Event Syst	Abbreviated Title (20 char) Discrete Event Syst
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Modeling, analysis, and control of discrete event dynamical systems. Modeling formalisms considered include state machines, Petri nets, and recursive processes. Supervisory control theory; notions of controllable and observable languages. Analysis and control of Petri nets. Communicating sequential processes. Applications to database, management, manufacturing, and communication protocols.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 566

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) Grad Standing	Advisory Prerequisite (254 char) Grad Standing
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Stephane Lafortune Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:	Print: Achilleas Anastasopoulos	Date: 7/21/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair:	Print: Heath Hofmann	Date: 7/21/23
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Modeling, analysis, and control of discrete event dynamical systems. Modeling formalisms considered include state machines, Petri nets, and recursive processes. Supervisory control theory; notions of controllable and observable languages. Analysis and control of Petri nets. Communicating sequential processes. Applications to database, management, manufacturing, and communication protocols.	Course Description Modeling, analysis, and control of discrete event dynamical systems. Modeling formalisms considered include state machines, Petri nets, and recursive processes. Supervisory control theory; notions of controllable and observable languages. Analysis and control of Petri nets. Communicating sequential processes. Applications to database, management, manufacturing, and communication protocols.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

1210 LSA Building
500 S. State Street
Ann Arbor, MI 48109-1382
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ro.umich.edu

Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-05
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 572	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 572
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Randomness and Computation	Course Title (full title) Randomness and Computation
☐	Abbreviated Title (20 char) Randomness and Comp	Abbreviated Title (20 char) Randomness and Comp
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Fundamentals of randomness and its pervasive use in computer science, including the probabilistic method, the design and analysis of algorithms, computational complexity, cryptography, combinatorics, logic and proof systems, and related topics.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 572

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) Coursework in probability and algorithms	Advisory Prerequisite (254 char) Coursework in probability and algorithms
☐	Enforced Prerequisite (254 char) EECS 376 (B+ or better, No OP/F); or Graduate Standing Minimum grade requirement:	Enforced Prerequisite (254 char) EECS 376 (B+ or better, No OP/F); or Graduate Standing Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components	Graded Component	Terms Typically Offered
☑ Lecture	☑	☑ Fall
☐ Seminar	☐	☐ Winter
☐ Recitation	☐	☐ Spring
☐ Lab	☐	☐ Summer
☐ Discussion	☐	☐ Spring/Summer
☐ Independent Study	☐	

Cognizant Faculty Member Name: Mahdi Cheraghchi Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print: Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print:Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Fundamentals of randomness and its pervasive use in computer science, including the probabilistic method, the design and analysis of algorithms, computational complexity, cryptography, combinatorics, logic and proof systems, and related topics.	Course Description Fundamentals of randomness and its pervasive use in computer science, including the probabilistic method, the design and analysis of algorithms, computational complexity, cryptography, combinatorics, logic and proof systems, and related topics.
Class Length Full term	Class Length Full term
Contact hours (lecture): 4	Contact hours (lecture): 4
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-05
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 574	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 574
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Computational Complexity	Course Title (full title) Computational Complexity
☐	Abbreviated Title (20 char) Computat Complexity	Abbreviated Title (20 char) Computat Complexity
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Fundamentals of the theory of computation and complexity theory. Computability, undecidability, and logic. Relations between complexity classes, NP-completeness, P-completeness, and randomized computation. Applications in selected areas such as cryptography, logic programming, theorem proving, approximation of optimization problems, or parallel computing.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 574

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) Coursework in probability and algorithms	Advisory Prerequisite (254 char) Coursework in probability and algorithms
☐	Enforced Prerequisite (254 char) EECS 376 (B+ or better, No OP/F); or Graduate Standing Minimum grade requirement:	Enforced Prerequisite (254 char) EECS 376 (B+ or better, No OP/F); or Graduate Standing Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components
- ☑ Lecture
- ☐ Seminar
- ☐ Recitation
- ☐ Lab
- ☑ Discussion
- ☐ Independent Study

Graded Component
- ☑
- ☐
- ☐
- ☐
- ☐
- ☐

Terms Typically Offered
- ☑ Fall
- ☐ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Mahdi Cheraghchi Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone:734-647-1754

CoE Curriculum Committee Representative:		Print: Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Fundamentals of the theory of computation and complexity theory. Computability, undecidability, and logic. Relations between complexity classes, NP-completeness, P-completeness, and randomized computation. Applications in selected areas such as cryptography, logic programming, theorem proving, approximation of optimization problems, or parallel computing.	Course Description Fundamentals of the theory of computation and complexity theory. Computability, undecidability, and logic. Relations between complexity classes, NP-completeness, P-completeness, and randomized computation. Applications in selected areas such as cryptography, logic programming, theorem proving, approximation of optimization problems, or parallel computing.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation) 1	Contact hours (recitation) 1
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-05
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 575	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 575
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Advanced Cryptography	Course Title (full title) Advanced Cryptography
☐	Abbreviated Title (20 char) Adv Cryptography	Abbreviated Title (20 char) Adv Cryptography
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) A rigorous introduction to the design of cryptosystems and to cryptanalysis. Topics include cryptanalysis of classical cryptosystems; theoretical analysis of one-way functions; DES and differential cryptanalysis; the RSA cryptosystem; ElGamal, elliptic, hyperelliptic and hidden mononomial cryptosystems; attacks on signature schemes, identification schemes and authentication codes; secret sharing; and zero knowledge.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 575

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
☐	Enforced Prerequisite (254 char) EECS 376 (B+ or better, No OP/F); or Graduate Standing Minimum grade requirement:	Enforced Prerequisite (254 char) EECS 376 (B+ or better, No OP/F); or Graduate Standing Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☑ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Paul Grubbs Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 734-647-1754

CoE Curriculum Committee Representative:		Print:Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description A rigorous introduction to the design of cryptosystems and to cryptanalysis. Topics include cryptanalysis of classical cryptosystems; theoretical analysis of one-way functions; DES and differential cryptanalysis; the RSA cryptosystem; ElGamal, elliptic, hyperelliptic and hidden mononomial cryptosystems; attacks on signature schemes, identification schemes and authentication codes; secret sharing; and zero knowledge.	Course Description A rigorous introduction to the design of cryptosystems and to cryptanalysis. Topics include cryptanalysis of classical cryptosystems; theoretical analysis of one-way functions; DES and differential cryptanalysis; the RSA cryptosystem; ElGamal, elliptic, hyperelliptic and hidden mononomial cryptosystems; attacks on signature schemes, identification schemes and authentication codes; secret sharing; and zero knowledge.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation) 1	Contact hours (recitation) 1
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-05
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 576	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 576
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Advanced Data Mining	Course Title (full title) Advanced Data Mining
☐	Abbreviated Title (20 char) Advanced Data Mining	Abbreviated Title (20 char) Advanced Data Mining
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Advanced topics in data mining. A mix of lectures, readings, and a semester-long group project will familiarize the students with recent methods for analyzing large-scale, real-world data and networks, and applications in various domains (e.g., web science, social science, neuroscience).	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 4 Undergraduate Max: Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 576

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 281 and (MATH 214 or 217 or 296 or 417 or 419, or ROB 101) and (STATS 412 or MATH 425), or graduate standing.	Advisory Prerequisite (254 char) EECS 281 and (MATH 214 or 217 or 296 or 417 or 419, or ROB 101) and (STATS 412 or MATH 425), or graduate standing.
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components / Graded Component
- ☑ Lecture — ☑
- ☐ Seminar — ☐
- ☐ Recitation — ☐
- ☐ Lab — ☐
- ☑ Discussion — ☐
- ☐ Independent Study — ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Danai Koutra Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print: Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	**Requested:**
Course Description Advanced topics in data mining. A mix of lectures, readings, and a semester-long group project will familiarize the students with recent methods for analyzing large-scale, real-world data and networks, and applications in various domains (e.g., web science, social science, neuroscience).	Course Description Advanced topics in data mining. A mix of lectures, readings, and a semester-long group project will familiarize the students with recent methods for analyzing large-scale, real-world data and networks, and applications in various domains (e.g., web science, social science, neuroscience).
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation) 1	Contact hours (recitation) 1
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:
Flux resources (Hadoop / Spark queue)

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-05
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 582	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 582
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Advanced Operating Systems	Course Title (full title) Advanced Operating Systems
☐	Abbreviated Title (20 char) Adv Operating Sys	Abbreviated Title (20 char) Adv Operating Sys
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Course discusses advanced topics and research issues in operating systems. Topics will be drawn from a variety of operating systems areas such as distributed systems and languages, networking, security and protection, real-time systems, modeling and analysis, etc.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 582

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 482/EQ	Advisory Prerequisite (254 char) EECS 482/EQ
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Baris Kasikci Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email:vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print:Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print:Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Course discusses advanced topics and research issues in operating systems. Topics will be drawn from a variety of operating systems areas such as distributed systems and languages, networking, security and protection, real-time systems, modeling and analysis, etc.	Course Description Course discusses advanced topics and research issues in operating systems. Topics will be drawn from a variety of operating systems areas such as distributed systems and languages, networking, security and protection, real-time systems, modeling and analysis, etc.
Class Length Full term	Class Length Full term
Contact hours (lecture): 4	Contact hours (lecture): 4
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-10
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 583	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 583
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Advanced Compilers	Course Title (full title) Advanced Compilers
☐	Abbreviated Title (20 char) Advanced Compilers	Abbreviated Title (20 char) Advanced Compilers
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) In-depth study of compiler backend design for high-performance architectures. Topics include control-flow and data-flow analysis, optimization, instruction scheduling, register allocation. Advanced topics include memory hierarchy management, instruction-level parallelism, predicated and speculative execution. The class focus is processor-specific compilation techniques, thus familiarity with both computer architecture and compilers is recommended.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 583

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 281 and 370 (EECS 483 is also recommended)	Advisory Prerequisite (254 char) EECS 281 and 370 (EECS 483 is also recommended)
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components
- ☑ Lecture
- ☐ Seminar
- ☐ Recitation
- ☐ Lab
- ☐ Discussion
- ☐ Independent Study

Graded Component
- ☑
- ☐
- ☐
- ☐
- ☐
- ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Scott Mahlke Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email:vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print:Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print:Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description In-depth study of compiler backend design for high-performance architectures. Topics include control-flow and data-flow analysis, optimization, instruction scheduling, register allocation. Advanced topics include memory hierarchy management, instruction-level parallelism, predicated and speculative execution. The class focus is processor-specific compilation techniques, thus familiarity with both computer architecture and compilers is recommended.	Course Description In-depth study of compiler backend design for high-performance architectures. Topics include control-flow and data-flow analysis, optimization, instruction scheduling, register allocation. Advanced topics include memory hierarchy management, instruction-level parallelism, predicated and speculative execution. The class focus is processor-specific compilation techniques, thus familiarity with both computer architecture and compilers is recommended.
Class Length Full term	Class Length Full term
Contact hours (lecture): 4	Contact hours (lecture): 4
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

1210 LSA Building
500 S. State Street
Ann Arbor, MI 48109-1382
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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-05
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 584	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 584
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Advanced Database Systems	Course Title (full title) Advanced Database Systems
☐	Abbreviated Title (20 char) Adv Dbase Sys	Abbreviated Title (20 char) Adv Dbase Sys
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Advanced topics and research issues in database management systems. Distributed databases, advanced query optimization, query processing, transaction processing, data models and architectures. Data management for emerging application areas, including bioinformatics, the internet, OLAP, and data mining. A substantial course project allows in-depth exploration of topics of interest.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 584

☐ Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char) EECS 484 or permission of instructor	Advisory Prerequisite (254 char) EECS 484 or permission of instructor
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐ Course Components / Graded Component

Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Barzan Mozafari Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print: Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print:Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Advanced topics and research issues in database management systems. Distributed databases, advanced query optimization, query processing, transaction processing, data models and architectures. Data management for emerging application areas, including bioinformatics, the internet, OLAP, and data mining. A substantial course project allows in-depth exploration of topics of interest.	Course Description Advanced topics and research issues in database management systems. Distributed databases, advanced query optimization, query processing, transaction processing, data models and architectures. Data management for emerging application areas, including bioinformatics, the internet, OLAP, and data mining. A substantial course project allows in-depth exploration of topics of interest.
Class Length Full term	Class Length Full term
Contact hours (lecture): 4	Contact hours (lecture): 4
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Core Course

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-08
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 587	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 587
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Parallel Computing	Course Title (full title) Parallel Computing
☐	Abbreviated Title (20 char) Parallel Computing	Abbreviated Title (20 char) Parallel Computing
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) The development of programs for parallel computers. Basic concepts such as speedup, load balancing, latency, system taxonomies. Design of algorithms for idealized models. Programming on parallel systems such as shared or distributed memory machines, networks. Grid computing. Performance analysis. Course includes a substantial term project.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 587

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 281 and grad standing	Advisory Prerequisite (254 char) EECS 281 and grad standing
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components / Graded Component
- ☑ Lecture — ☑
- ☐ Seminar — ☐
- ☐ Recitation — ☐
- ☑ Lab — ☐
- ☐ Discussion — ☐
- ☐ Independent Study — ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Quentin Stout Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email:vyas@umich.edu Phone:647-1754

CoE Curriculum Committee Representative:		Print:Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print:Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description The development of programs for parallel computers. Basic concepts such as speedup, load balancing, latency, system taxonomies. Design of algorithms for idealized models. Programming on parallel systems such as shared or distributed memory machines, networks. Grid computing. Performance analysis. Course includes a substantial term project.	Course Description The development of programs for parallel computers. Basic concepts such as speedup, load balancing, latency, system taxonomies. Design of algorithms for idealized models. Programming on parallel systems such as shared or distributed memory machines, networks. Grid computing. Performance analysis. Course includes a substantial term project.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab) 1	Contact hours (lab) 1

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-08
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 588	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 588
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Computer and Network Security	Course Title (full title) Computer and Network Security
☐	Abbreviated Title (20 char) Comp Netwk Security	Abbreviated Title (20 char) Comp Netwk Security
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Survey of advanced topics and research issues in computer and network security. Topics will be drawn from a variety of areas such as mandatory and discretionary security policies, secure storage, security kernels, trust management, preventing software vulnerabilities, applied cryptography, network security.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 588

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 482 or 489; or graduate standing.	Advisory Prerequisite (254 char) EECS 482 or 489; or graduate standing.
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components / Graded Component
- ☑ Lecture / ☑
- ☐ Seminar / ☐
- ☐ Recitation / ☐
- ☐ Lab / ☐
- ☐ Discussion / ☐
- ☐ Independent Study / ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Atul Prakash Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person:Punam Vyas Email:vyas@umich.edu Phone:647-1754

CoE Curriculum Committee Representative:		Print:Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print:Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Survey of advanced topics and research issues in computer and network security. Topics will be drawn from a variety of areas such as mandatory and discretionary security policies, secure storage, security kernels, trust management, preventing software vulnerabilities, applied cryptography, network security.	Course Description Survey of advanced topics and research issues in computer and network security. Topics will be drawn from a variety of areas such as mandatory and discretionary security policies, secure storage, security kernels, trust management, preventing software vulnerabilities, applied cryptography, network security.
Class Length Full term	Class Length Full term
Contact hours (lecture): 4	Contact hours (lecture): 4
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-17
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 589	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 589
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Advanced Computer Networks	Course Title (full title) Advanced Computer Networks
☐	Abbreviated Title (20 char) Adv Comp Net	Abbreviated Title (20 char) Adv Comp Net
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Advanced topics and research issues in computer networks. Topics include routing protocols, multicast delivery, congestion control, quality of service support, network security, pricing and accounting and wireless access and mobile networking. Emphasis is placed on performance trade-offs in protocol and architecture designs. Readings assigned from research publications. A course project allows in-depth exploration of topics of interest.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 589

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 489	Advisory Prerequisite (254 char) EECS 489
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☑ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Z. Morley Mao Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person:Punam Vyas Email:vyas@umich.edu Phone: 734-647-1754

CoE Curriculum Committee Representative:		Print:Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print:Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Advanced topics and research issues in computer networks. Topics include routing protocols, multicast delivery, congestion control, quality of service support, network security, pricing and accounting and wireless access and mobile networking. Emphasis is placed on performance trade-offs in protocol and architecture designs. Readings assigned from research publications. A course project allows in-depth exploration of topics of interest.	Course Description Advanced topics and research issues in computer networks. Topics include routing protocols, multicast delivery, congestion control, quality of service support, network security, pricing and accounting and wireless access and mobile networking. Emphasis is placed on performance trade-offs in protocol and architecture designs. Readings assigned from research publications. A course project allows in-depth exploration of topics of interest.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation) 1	Contact hours (recitation) 1
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-08
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 590	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 590
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Advanced Programming Languages	Course Title (full title) Advanced Programming Languages
☐	Abbreviated Title (20 char) Adv Prog Lang	Abbreviated Title (20 char) Adv Prog Lang
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Fundamental concepts in programming languages as well as recent topics and trends in PL research. Topics include semantics, type systems, program verification using theorem provers, software model checking, and program analysis. Course focuses on applying PL concepts to improve software reliability. Course includes semester long individual research project.	
☐	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 590

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 281 or equivalent	Advisory Prerequisite (254 char) EECS 281 or equivalent
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☑ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Westley Weimer Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 734-647-1754

CoE Curriculum Committee Representative:		Print: Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Fundamental concepts in programming languages as well as recent topics and trends in PL research. Topics include semantics, type systems, program verification using theorem provers, software model checking, and program analysis. Course focuses on applying PL concepts to improve software reliability. Course includes semester long individual research project.	Course Description Fundamental concepts in programming languages as well as recent topics and trends in PL research. Topics include semantics, type systems, program verification using theorem provers, software model checking, and program analysis. Course focuses on applying PL concepts to improve software reliability. Course includes semester long individual research project.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation) 1	Contact hours (recitation) 1
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-24
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 591	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 591
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Distributed Systems	Course Title (full title) Distributed Systems
☐	Abbreviated Title (20 char) Dist Sys	Abbreviated Title (20 char) Dist Sys
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Principles and practice of distributed system design. Computations, consistency semantics and failure models. Programming paradigms including group communication, RPC, distributed shared memory, and distributed objects. Operating system kernel support; distributed system services including replication, caching, file system management, naming, clock synchronization and multicast communication.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 4 Undergraduate Max: Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 591

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

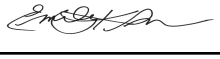
	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) EECS 482 and graduate standing.	Advisory Prerequisite (254 char) EECS 482 and graduate standing.
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions Students who have previously enrolled in 491 cannot get credit for 591.	Credit Exclusions Students who have previously enrolled in 491 cannot get credit for 591.
☑	Course Components / Graded Component ☑ Lecture ☑ ☐ Seminar ☐ ☐ Recitation ☐ ☐ Lab ☐ ☑ Discussion ☐ ☐ Independent Study ☐	Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer
	Cognizant Faculty Member Name: Manos Kapritsos	Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative: Print: Amir Kamil Date:5/24/23

CoE Curriculum Committee Chair: Print: Date:

Home Department Chair:  Print: Emily Mower Provost Date:5/24/23

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Principles and practice of distributed system design. Computations, consistency semantics and failure models. Programming paradigms including group communication, RPC, distributed shared memory, and distributed objects. Operating system kernel support; distributed system services including replication, caching, file system management, naming, clock synchronization and multicast communication.	Course Description Principles and practice of distributed system design. Computations, consistency semantics and failure models. Programming paradigms including group communication, RPC, distributed shared memory, and distributed objects. Operating system kernel support; distributed system services including replication, caching, file system management, naming, clock synchronization and multicast communication.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation) 1	Contact hours (recitation) 1
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-08
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 592	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 592
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Foundations of Artificial Intelligence	Course Title (full title) Foundations of Artificial Intelligence
☐	Abbreviated Title (20 char) AI Foundations	Abbreviated Title (20 char) AI Foundations
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) An advanced introduction to AI emphasizing its theoretical underpinnings. Topics include search, logic, knowledge representation, reasoning planning, decision making under uncertainty, and machine learning.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 4 Undergraduate Max: Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 592

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
☐	Enforced Prerequisite (254 char) Graduate Standing Minimum grade requirement:	Enforced Prerequisite (254 char) Graduate Standing Minimum grade requirement:
☐	Credit Exclusions No credit to a student who has taken EECS 492.	Credit Exclusions No credit to a student who has taken EECS 492.

☐

Course Components / Graded Component
- ☑ Lecture / ☑
- ☐ Seminar / ☐
- ☐ Recitation / ☐
- ☐ Lab / ☐
- ☑ Discussion / ☐
- ☐ Independent Study / ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Mithun Chakraborty Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print: Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description An advanced introduction to AI emphasizing its theoretical underpinnings. Topics include search, logic, knowledge representation, reasoning planning, decision making under uncertainty, and machine learning.	Course Description An advanced introduction to AI emphasizing its theoretical underpinnings. Topics include search, logic, knowledge representation, reasoning planning, decision making under uncertainty, and machine learning.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation) 1	Contact hours (recitation) 1
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-08
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 593	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 593
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Human-Computer Interaction	Course Title (full title) Human-Computer Interaction
☐	Abbreviated Title (20 char) HCI	Abbreviated Title (20 char) HCI
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Principles (e.g., human-centered systems design, usability, accessibility) and methods(e.g., requirements gathering, functional prototyping, user study evaluation) of technical Human-ComputerInteraction (HCI) research. Survey of HCI research threads including Human-AI Interaction, Social Computing, Behavior Modeling, Education Technologies. Group assignments give students exposure to HCI research methods.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☑	Course Credit Type Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 593

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
☐	Enforced Prerequisite (254 char) Graduate standing Minimum grade requirement:	Enforced Prerequisite (254 char) Graduate standing Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Nikola Banovic Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print: Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Principles (e.g., human-centered systems design, usability, accessibility) and methods(e.g., requirements gathering, functional prototyping, user study evaluation) of technical Human-ComputerInteraction (HCI) research. Survey of HCI research threads including Human-AI Interaction, Social Computing, Behavior Modeling, Education Technologies. Group assignments give students exposure to HCI research methods.	Course Description Principles (e.g., human-centered systems design, usability, accessibility) and methods(e.g., requirements gathering, functional prototyping, user study evaluation) of technical Human-ComputerInteraction (HCI) research. Survey of HCI research threads including Human-AI Interaction, Social Computing, Behavior Modeling, Education Technologies. Group assignments give students exposure to HCI research methods.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:
n/a

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-06-02
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 595	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 595
☐	☑ Course is Cross-Listed with Other Departments	☑ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
	Linguistics - LING- 541, School of Information - SI -561	Linguistics - LING- 541, School of Information - SI -561
☐	Course Title (full title) Natural Language Processing	Course Title (full title) Natural Language Processing
☐	Abbreviated Title (20 char) Nat Lang Proc	Abbreviated Title (20 char) Nat Lang Proc
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Linguistic fundamentals of natural language processing (NLP), part of speech tagging, hidden Markov models, syntax and parsing, lexical semantics, compositional semantics, word sense disambiguation, machine translation. Additional topics such as sentiment analysis, text generation, and deep learning for NLP.	
☐	Full Term Credit Hours Undergraduate Min: 3 Graduate Min: 3 Undergraduate Max: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 595

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) Senior standing	Advisory Prerequisite (254 char) Senior standing
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☐ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Joyce Chai Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative Print:: Amir Kamil Date: 5/17/2023

CoE Curriculum Committee Chair: Print: Date:

Home Department Chair: Print: Emily Mower Provost Date: 5/18/2023

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Linguistic fundamentals of natural language processing (NLP), part of speech tagging, hidden Markov models, syntax and parsing, lexical semantics, compositional semantics, word sense disambiguation, machine translation. Additional topics such as sentiment analysis, text generation, and deep learning for NLP.	Course Description Linguistic fundamentals of natural language processing (NLP), part of speech tagging, hidden Markov models, syntax and parsing, lexical semantics, compositional semantics, word sense disambiguation, machine translation. Additional topics such as sentiment analysis, text generation, and deep learning for NLP.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-06-02
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 598	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 598
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Special Topics	Course Title (full title) Special Topics
☐	Abbreviated Title (20 char) Special Topics	Abbreviated Title (20 char) Special Topics
☑	Course Description (Please limit to 50 words and attach separate sheet if necessary) Topics of current interest in computer science and engineering. Lectures, seminar or laboratory. Can be taken more than once for credit.	
☐	Full Term Credit Hours Undergraduate Min: 1 Graduate Min: 1 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☑ Course is Repeatable for Credit Maximum number of repeatable credits: 999	☐ Course is Y graded ☑ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 598

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) Permission of instructor or counselor	Advisory Prerequisite (254 char) Permission of instructor or counselor
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

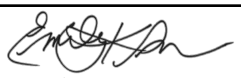
Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Emily Mower Provost Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person:Punam Vyas Email: vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print: Amir Kamil	Date:6/12/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Emily Mower Provost	Date:6/12/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Topics of current interest in electrical engineering and computer science. Lectures, seminar or laboratory. Can be taken more than once for credit.	Course Description Topics of current interest in computer science and engineering. Lectures, seminar or laboratory. Can be taken more than once for credit.
Class Length Full term	Class Length Full term
Contact hours (lecture):	Contact hours (lecture):
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-16
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 599	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 599
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Directed Study	Course Title (full title) Directed Study
☐	Abbreviated Title (20 char) Directed Study	Abbreviated Title (20 char) Directed Study
☑	Course Description (Please limit to 50 words and attach separate sheet if necessary) Individual study of selected advanced topics in computer science and engineering. May include experimental work or reading. Primarily for graduate students. To be graded on satisfactory/unsatisfactory basis ONLY.	
☐	Full Term Credit Hours Undergraduate Min: 1 Graduate Min: 1 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student	
☐	Repeatability ☑ Course is Repeatable for Credit Maximum number of repeatable credits: 999	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 599

☐

Grading Basis
- ☐ Graded (A – E)
- ☐ Credit/No Credit
- ☑ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) Prior arrangement with instructor	Advisory Prerequisite (254 char) Prior arrangement with instructor
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components / Graded Component
- ☐ Lecture ☐
- ☐ Seminar ☐
- ☐ Recitation ☐
- ☐ Lab ☐
- ☐ Discussion ☐
- ☑ Independent Study ☑

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☑ Spring
- ☑ Summer
- ☑ Spring/Summer

Cognizant Faculty Member Name: Emily Mower Provost Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person:Punam Vyas Email:vyas@umich.edu Phone:734-647-1754

CoE Curriculum Committee Representative:		Print:Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print:Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Individual study of selected advanced topics in electrical engineering and computer science. May include experimental work or reading. Primarily for graduate students. To be graded on satisfactory/unsatisfactory basis ONLY.	Course Description Individual study of selected advanced topics in computer science and engineering. May include experimental work or reading. Primarily for graduate students. To be graded on satisfactory/unsatisfactory basis ONLY.
Class Length Full term	Class Length Full term
Contact hours (lecture): 1 - 4	Contact hours (lecture): 1 - 4
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

1210 LSA Building
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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-10
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 601	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 601
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Introduction to CSE Graduate Research	Course Title (full title) Introduction to CSE Graduate Research
☐	Abbreviated Title (20 char) Intro CSE Grad Res	Abbreviated Title (20 char) Intro CSE Grad Res
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) An introduction for incoming Ph.D. students and research-focused Master's students to a wide range of topics critical to academic research. Rotating speakers will give perspective on the research process, time management, publishing in CS, managing the highs and lows of grad school, advisor interactions, career paths, etc.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 1 Undergraduate Max: Graduate Max: 1	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 601

☐

Grading Basis
- ☐ Graded (A – E)
- ☐ Credit/No Credit
- ☑ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
☐	Enforced Prerequisite (254 char) Graduate Standing Minimum grade requirement:	Enforced Prerequisite (254 char) Graduate Standing Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components
- ☐ Lecture
- ☑ Seminar
- ☐ Recitation
- ☐ Lab
- ☐ Discussion
- ☐ Independent Study

Graded Component
- ☐
- ☑
- ☐
- ☐
- ☐
- ☐

Terms Typically Offered
- ☑ Fall
- ☐ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Alanson Sample Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 734-647-1754

CoE Curriculum Committee Representative:		Print: Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description An introduction for incoming Ph.D. students and research-focused Master's students to a wide range of topics critical to academic research. Rotating speakers will give perspective on the research process, time management, publishing in CS, managing the highs and lows of grad school, advisor interactions, career paths, etc.	Course Description An introduction for incoming Ph.D. students and research-focused Master's students to a wide range of topics critical to academic research. Rotating speakers will give perspective on the research process, time management, publishing in CS, managing the highs and lows of grad school, advisor interactions, career paths, etc.
Class Length Full term	Class Length Full term
Contact hours (lecture): 1	Contact hours (lecture): 1
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-11
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 602	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 602
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Reinforcement Learning Theory	Course Title (full title) Reinforcement Learning Theory
☐	Abbreviated Title (20 char) ReinforceLearnTheory	Abbreviated Title (20 char) ReinforceLearnTheory
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Basic theories and principles of reinforcement learning, and model-based and model-free reinforcement learning algorithms. Topics: Value iteration, policy iteration, Q-learning, SARSA, policy-gradient, variance reduction, linear and nonlinear function approximation, deep reinforcement learning, exploration-exploitation, convergence analysis, regret analysis.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 602

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☑	Advisory Prerequisite (254 char) EECS 501	Advisory Prerequisite (254 char) ECE 501
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Heath Hofmann Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email:vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date:7/11/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date:7/11/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Basic theories and principles of reinforcement learning, and model-based and model-free reinforcement learning algorithms. Topics: Value iteration, policy iteration, Q-learning, SARSA, policy-gradient, variance reduction, linear and nonlinear function approximation, deep reinforcement learning, exploration-exploitation, convergence analysis, regret analysis.	Course Description Basic theories and principles of reinforcement learning, and model-based and model-free reinforcement learning algorithms. Topics: Value iteration, policy iteration, Q-learning, SARSA, policy-gradient, variance reduction, linear and nonlinear function approximation, deep reinforcement learning, exploration-exploitation, convergence analysis, regret analysis.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-11
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 605	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 605
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Data Science and Machine Learning Design Laboratory	Course Title (full title) Data Science and Machine Learning Design Laboratory
☐	Abbreviated Title (20 char) DS and ML Des Lab	Abbreviated Title (20 char) DS and ML Des Lab
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) This course uses a sequence of hands-on projects to bring into sharper focus the following concepts in the data-to-decision cycle: 1. how smart (or bad) data can positively (or negatively) affect decisions in the design and operation of an engineering system; 2. how to acquire such data, clean and store it via appropriate pre-processing and post-processing it for aiding reproducibility; 3. how to display, render, deploy and interpret it in the context of a real or simulated closed-loop type cloud based engineering system; and finally, 4. how to communicate the shortcomings and vulnerabilities of such systems, including plug-and-play systems using pre-trained off-the-shelf deep learning models, when integrated into a decision-making system. 5. conceptualization and execution of an open-ended, reproducible cloud-based design project	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 4 Undergraduate Max: Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student, Non-Rackham Graduate Student	
	Repeatability	

☐	☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 605

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☑	Advisory Prerequisite (254 char) EECS 505 or 551 or graduate equivalent	Advisory Prerequisite (254 char) ECE 505 or 551 or graduate equivalent
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components
- ☑ Lecture
- ☐ Seminar
- ☐ Recitation
- ☑ Lab
- ☐ Discussion
- ☐ Independent Study

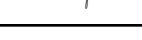
Graded Component
- ☑
- ☐
- ☐
- ☐
- ☐
- ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Rajesh Nadakuditi Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date:7/11/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date:7/11/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	**Requested:**
Course Description This course uses a sequence of hands-on projects to bring into sharper focus the following concepts in the data-to-decision cycle: 1. how smart (or bad) data can positively (or negatively) affect decisions in the design and operation of an engineering system; 2. how to acquire such data, clean and store it via appropriate pre-processing and post-processing it for aiding reproducibility; 3. how to display, render, deploy and interpret it in the context of a real or simulated closed-loop type cloud based engineering system; and finally, 4. how to communicate the shortcomings and vulnerabilities of such systems, including plug-and-play systems using pre-trained off-the-shelf deep learning models, when integrated into a decision-making system. 5. conceptualization and execution of an open-ended, reproducible cloud-based design project	Course Description This course uses a sequence of hands-on projects to bring into sharper focus the following concepts in the data-to-decision cycle: 1. how smart (or bad) data can positively (or negatively) affect decisions in the design and operation of an engineering system; 2. how to acquire such data, clean and store it via appropriate pre-processing and post-processing it for aiding reproducibility; 3. how to display, render, deploy and interpret it in the context of a real or simulated closed-loop type cloud based engineering system; and finally, 4. how to communicate the shortcomings and vulnerabilities of such systems, including plug-and-play systems using pre-trained off-the-shelf deep learning models, when integrated into a decision-making system. 5. conceptualization and execution of an open-ended, reproducible cloud-based design project
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab) 1	Contact hours (lab) 1

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:

The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-11
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 620	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 620
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Electronic and Optical Properties of Semiconductors	Course Title (full title) Electronic and Optical Properties of Semiconductors
☐	Abbreviated Title (20 char) Elect Opt Semicon	Abbreviated Title (20 char) Elect Opt Semicon
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) The course discusses in detail the theory behind important semiconductor based experiments such as Hall effect and Hall mobility measurement; velocity-field measurement; photoluminescence; gain; pump-probe studies; pressure and strain dependent studies. Theory will cover: Bandstructure in quantum wells; effect of strain on bandstructure; transport theory; Monte Carlo methods for high field transport; excitons, optical absorption, luminescence and gain.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 4 Undergraduate Max: Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 620

☐ Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☑	Advisory Prerequisite (254 char) EECS 520, or EECS 540	Advisory Prerequisite (254 char) ECE 520, or ECE 540
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐ Course Components / Graded Component

Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Zetian Mi Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date:7/11/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date:7/11/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description The course discusses in detail the theory behind important semiconductor based experiments such as Hall effect and Hall mobility measurements; velocity-field measurement; photoluminescence; gain; pump-probe studies; pressure and strain dependent studies. Theory will cover: Bandstructure in quantum wells; effect of strain on bandstructure; transport theory, Monte Carlo methods for high field transport; excitons, optical absorption, luminescence and gain.	Course Description The course discusses in detail the theory behind important semiconductor based experiments such as Hall effect and Hall mobility measurement; velocity-field measurement; photoluminescence; gain; pump-probe studies; pressure and strain dependent studies. Theory will cover: Bandstructure in quantum wells; effect of strain on bandstructure; transport theory; Monte Carlo methods for high field transport; excitons, optical absorption, luminescence and gain.
Class Length Full term	Class Length Full term
Contact hours (lecture): 4	Contact hours (lecture): 4
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-24
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 631	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 631
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Electromagnetic Scattering	Course Title (full title) Electromagnetic Scattering
☐	Abbreviated Title (20 char) Em Scattering	Abbreviated Title (20 char) Em Scattering
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Boundary conditions, field representations. Low and high frequency scattering. Scattering by half plane (Wiener-Hopf method) and wedge (Maliuzhinets method); edge diffraction. Scattering by a cylinder and sphere: Watson transformation, Airy and Fock functions, creeping waves. Geometrical and physical theories of diffraction.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 631

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

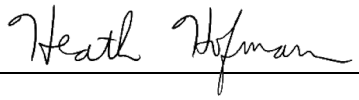
	CURRENT LISTING	**REQUESTED LISTING**
☑	Advisory Prerequisite (254 char) Graduate standing and EECS 530.	Advisory Prerequisite (254 char) Graduate standing and ECE 530
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☑	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Heath Hofmann Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umch.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/24/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/24/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Boundary conditions, field representations. Low and high frequency scattering. Scattering by half plane (Wiener-Hopf method) and wedge (Maliuzhinets method); edge diffraction. Scattering by a cylinder and sphere: Watson transformation, Airy and Fock functions, creeping waves. Geometrical and physical theories of diffraction.	Course Description Boundary conditions, field representations. Low and high frequency scattering. Scattering by half plane (Wiener-Hopf method) and wedge (Maliuzhinets method); edge diffraction. Scattering by a cylinder and sphere: Watson transformation, Airy and Fock functions, creeping waves. Geometrical and physical theories of diffraction.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

1210 LSA Building
500 S. State Street
Ann Arbor, MI 48109-1382
Phone: 734.763.2113
Fax: 734.936.3148
ro.curriculum@umich.edu
ro.umich.edu

Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-12
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 633	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 633
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Numerical Methods in Electromagnetics	Course Title (full title) Numerical Methods in Electromagnetics
☐	Abbreviated Title (20 char) Num Meth E-M	Abbreviated Title (20 char) Num Meth E-M
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Numerical techniques for antennas and scattering; integral representation: solutions of integral equations: method of moments, Galerkin's technique, conjugate gradient FFT; finite element methods for 2-D and 3-D simulations; hybrid finite element/boundary integral methods; applications: wire, patch and planar arrays; scattering composite structures.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 633

☐ Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☑	Advisory Prerequisite (254 char) EECS 530	Advisory Prerequisite (254 char) ECE 530
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

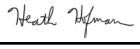
Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Heath Hofmann Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person:Punam Vyas Email: vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date:6/12/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date:6/12/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Numerical techniques for antennas and scattering; integral representation: solutions of integral equations: method of moments, Galerkin's technique, conjugate gradient FFT; finite element methods for 2-D and 3-D simulations; hybrid finite element/boundary integral methods; applications: wire, patch and planar arrays; scattering composite structures.	Course Description Numerical techniques for antennas and scattering; integral representation: solutions of integral equations: method of moments, Galerkin's technique, conjugate gradient FFT; finite element methods for 2-D and 3-D simulations; hybrid finite element/boundary integral methods; applications: wire, patch and planar arrays; scattering composite structures.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested

☐ New Course
☑ Modification of Existing Course
☐ Deletion of Existing Course

Date of Submission: 2023-07-12
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 634	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 634
☐	☑ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number Applied Physics - APPPHYS - 611, Physics - PHYSICS - 611	☑ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number Applied Physics - APPPHYS - 611, Physics - PHYSICS - 611
☐	Course Title (full title) Nonlinear Optics	Course Title (full title) Nonlinear Optics
☐	Abbreviated Title (20 char) Nonlinear Optics	Abbreviated Title (20 char) Nonlinear Optics
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Formalism of wave propagation in nonlinear media; susceptibility tensor; second harmonic generation and three-wave mixing; phase matching; third order nonlinearities and four-wave mixing processes; stimulated Raman and Brillouin scattering. Special topics: nonlinear optics in fibers, including solitons and self-phase modulation.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 634

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☑	Advisory Prerequisite (254 char) EECS 537 or 538 or 530. Graduate standing.	Advisory Prerequisite (254 char) ECE 537 or 538 or 530. Graduate standing.
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

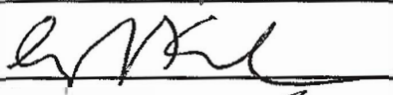
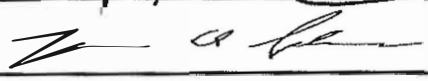
Course Components / Graded Component
- ☑ Lecture / ☑
- ☐ Seminar / ☐
- ☐ Recitation / ☐
- ☐ Lab / ☐
- ☐ Discussion / ☐
- ☐ Independent Study / ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Herbert Winful Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date:7/12/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:	Heath Hofmann	Print: Heath Hofmann	Date:7/12/23
Cross-Listed Department Chair:		Print: Cagliyan Kurdak	Date: 8/14/23
Cross-Listed Department Chair:		Print: Tom Schwarz (Physics)	Date: 8/11/23
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:

Course Description
Formalism of wave propagation in nonlinear media; susceptibility tensor; second harmonic generation and three-wave mixing; phase matching; third order nonlinearities and four-wave mixing processes; stimulated Raman and Brillouin scattering. Special topics: nonlinear optics in fibers, including solitons and self-phase modulation.

Class Length
Full term

Contact hours (lecture):
3

Contact hours (recitation)

Contact hours (lab)

Requested:

Course Description
Formalism of wave propagation in nonlinear media; susceptibility tensor; second harmonic generation and three-wave mixing; phase matching; third order nonlinearities and four-wave mixing processes; stimulated Raman and Brillouin scattering. Special topics: nonlinear optics in fibers, including solitons and self-phase modulation.

Class Length
Full term

Contact hours (lecture):
3

Contact hours (recitation)

Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

Course Approval Request Form

Office of the Registrar, University of Michigan

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Fax: 734.936.3148
ro.curriculum@umich.edu
ro.umich.edu

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-24
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☐	Dept (Home): Physics Subject: PHYSICS Catalog: 542	Dept (Home): Physics Subject: PHYSICS Catalog: 542
☑	☑ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number Elec Eng Comp Sci - EECS - 638	☑ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number Elec Comp Eng - ECE - 638
☐	Course Title (full title) Quantum Optics	Course Title (full title) Quantum Optics
☐	Abbreviated Title (20 char) Quantum Optics	Abbreviated Title (20 char) Quantum Optics
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) The atom-field interaction; density matrix; quantum theory of radiation including spontaneous emission; optical Bloch equations and theory of resonance fluorescence; coherent pulse propagation; dressed atoms and squeezed states; special topics in nonlinear optics.	
☐	Full Term Credit Hours Undergraduate Min: Undergraduate Max: Graduate Min: 3 Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Undergraduate Max: Graduate Min: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Physics Catalog: 542

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char) PHYSICS, Quantum mechanics, electrodynamic and atomic physics.	Advisory Prerequisite (254 char) PHYSICS,Quantum mechanics, electrodynamic and atomic physics.
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

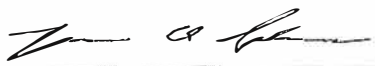
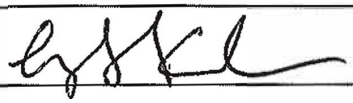
Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Mackillo Kira Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/24/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print:	Date:
Cross-Listed Department Chair:	Heath Hofmann	Print: Heath Hofmann	Date: 7/24/23
Cross-Listed Department Chair		Print: Tom Schwarz (Physics)	Date: 8/11/23
Cross-Listed Department Chair:		Print: Cagliyan Kurdak	Date: 8/14/23

DEPARTMENTAL/COLLEGE USE ONLY

Current:

Course Description
The atom-field interaction; density matrix; quantum theory of radiation including spontaneous emission; optical Bloch equations and theory of resonance fluorescence; coherent pulse propagation; dressed atoms and squeezed states; special topics in nonlinear optics.

Class Length
Full term

Contact hours (lecture):
3

Contact hours (recitation)

Contact hours (lab)

Requested:

Course Description
The atom-field interaction; density matrix; quantum theory of radiation including spontaneous emission; optical Bloch equations and theory of resonance fluorescence; coherent pulse propagation; dressed atoms and squeezed states; special topics in nonlinear optics.

Class Length
Full term

Contact hours (lecture):
3

Contact hours (recitation)

Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-13
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 650	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 650
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Channel Coding Theory	Course Title (full title) Channel Coding Theory
☐	Abbreviated Title (20 char) Chanel Coding Thry	Abbreviated Title (20 char) Chanel Coding Thry
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) The theory of channel coding for reliable communication and computer memories. Error correcting codes; linear, cyclic and convolutional codes; encoding and decoding algorithms; performance evaluation of codes on a variety of channels.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 650

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☑	Advisory Prerequisite (254 char) EECS 501 and MATH 419	Advisory Prerequisite (254 char) ECE 501 and MATH 419
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components / Graded Component
- ☑ Lecture — ☑
- ☐ Seminar — ☐
- ☐ Recitation — ☐
- ☐ Lab — ☐
- ☐ Discussion — ☐
- ☐ Independent Study — ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Achilleas Anastasopoulos Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date:7/13/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print:Heath Hofmann	Date:7/13/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description The theory of channel coding for reliable communication and computer memories. Error correcting codes; linear, cyclic and convolutional codes; encoding and decoding algorithms; performance evaluation of codes on a variety of channels.	Course Description The theory of channel coding for reliable communication and computer memories. Error correcting codes; linear, cyclic and convolutional codes; encoding and decoding algorithms; performance evaluation of codes on a variety of channels.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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ro.curriculum@umich.edu
ro.umich.edu

Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-13
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Electrical & Computer Engineering Subject: EECS Catalog: 659	Dept (Home): Elec Engin & Computer Sci Subject: ECE Catalog: 659
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Adaptive Signal Processing	Course Title (full title) Adaptive Signal Processing
☐	Abbreviated Title (20 char) Adapt Signal Proc	Abbreviated Title (20 char) Adapt Signal Proc
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Theory and applications of adaptive filtering in systems and signal processing. Iterative methods of optimization and their convergence properties: transversal filters; LMS (gradient) algorithms. Adaptive Kalman filtering and least-squares algorithms. Specialized structures for implementation; e.g., least-squares lattice filters, systolic arrays. Applications to detection, noise cancelling, speech processing, and beam forming.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Electrical & Computer Engineering Catalog: 659

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☑	Advisory Prerequisite (254 char) EECS 564 or EECS 559	Advisory Prerequisite (254 char) ECE 564 or ECE 559
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Alfred Hero Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email:vyas@umich.edu Phone: 647-1754

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date:7/13/21
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print:Heath Hofmann	Date:7/13/21
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Theory and applications of adaptive filtering in systems and signal processing. Iterative methods of optimization and their convergence properties: transversal filters; LMS (gradient) algorithms. Adaptive Kalman filtering and least-squares algorithms. Specialized structures for implementation; e.g., least-squares lattice filters, systolic arrays. Applications to detection, noise cancelling, speech processing, and beam forming.	Course Description Theory and applications of adaptive filtering in systems and signal processing. Iterative methods of optimization and their convergence properties: transversal filters; LMS (gradient) algorithms. Adaptive Kalman filtering and least-squares algorithms. Specialized structures for implementation; e.g., least-squares lattice filters, systolic arrays. Applications to detection, noise cancelling, speech processing, and beam forming.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

1210 LSA Building
500 S. State Street
Ann Arbor, MI 48109-1382
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Fax: 734.936.3148
ro.curriculum@umich.edu
ro.umich.edu

Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-10
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 670	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 670
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Special Topics in Computer Architecture	Course Title (full title) Special Topics in Computer Architecture
☐	Abbreviated Title (20 char) Spec Top Comp Arch	Abbreviated Title (20 char) Spec Top Comp Arch
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Current topics of interest in computer architecture. This course may be repeated for credit.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☑ Course is Repeatable for Credit Maximum number of repeatable credits: 6	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 670

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☑	Advisory Prerequisite (254 char) EECS 570, Graduate standing and permission of instructor.	Advisory Prerequisite (254 char) CSE 570, Graduate standing and permission of instructor.
☐	Enforced Prerequisite (254char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components
- ☑ Lecture
- ☐ Seminar
- ☐ Recitation
- ☐ Lab
- ☐ Discussion
- ☐ Independent Study

Graded Component
- ☑
- ☐
- ☐
- ☐
- ☐
- ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Mower Provost Emily Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 734-647-1754

CoE Curriculum Committee Representative:		Print: Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Current topics of interest in computer architecture. This course may be repeated for credit.	Course Description Current topics of interest in computer architecture. This course may be repeated for credit.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-10
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 692	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 692
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Advanced Artificial Intelligence	Course Title (full title) Advanced Artificial Intelligence
☐	Abbreviated Title (20 char) Adv Artif Intellig	Abbreviated Title (20 char) Adv Artif Intellig
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Exploration of advanced topics in Artificial Intelligence, intended as preparation for research in the field. Emphasizes research methods and practice, through explicit instruction, analysis of current literature, and a term project devoted to replicating published findings. Coursework comprises extensive reading, research and writing assignments, presentations, quizzes, and the replication project.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 4 Undergraduate Max: Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 692

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
☑	Enforced Prerequisite (254 char) EECS 592 or 492; (C or better, No OP/F) Minimum grade requirement: C	Enforced Prerequisite (254 char) CSE 592 or EECS 492; (C or better, No OP/F) Minimum grade requirement: C
☐	Credit Exclusions	Credit Exclusions

☐

Course Components / Graded Component
- ☑ Lecture / ☑
- ☐ Seminar / ☐
- ☐ Recitation / ☐
- ☐ Lab / ☐
- ☐ Discussion / ☐
- ☐ Independent Study / ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Michael Wellman Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 734-647-1754

CoE Curriculum Committee Representative:		Print: Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Exploration of advanced topics in Artificial Intelligence, intended as preparation for research in the field. Emphasizes research methods and practice, through explicit instruction, analysis of current literature, and a term project devoted to replicating published findings. Coursework comprises extensive reading, research and writing assignments, presentations, quizzes, and the replication project.	Course Description Exploration of advanced topics in Artificial Intelligence, intended as preparation for research in the field. Emphasizes research methods and practice, through explicit instruction, analysis of current literature, and a term project devoted to replicating published findings. Coursework comprises extensive reading, research and writing assignments, presentations, quizzes, and the replication project.
Class Length Full term	Class Length Full term
Contact hours (lecture): 4	Contact hours (lecture): 4
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-06-12
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 698	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 698
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Master's Thesis	Course Title (full title) Master's Thesis
☐	Abbreviated Title (20 char) Master's Thesis	Abbreviated Title (20 char) Master's Thesis
☑	Course Description (Please limit to 50 words and attach separate sheet if necessary) To be elected by CSE students pursuing the master's thesis option. May be taken more than once up to a total of 6 credit hours. To be graded on a satisfactory/unsatisfactory basis ONLY.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 1 Undergraduate Max: Graduate Max: 6	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☑ Course is Repeatable for Credit Maximum number of repeatable credits: 999	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 698

☑

Grading Basis
- ☐ Graded (A – E)
- ☐ Credit/No Credit
- ☑ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☑ Instructor Consent
- ☐ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consen

	CURRENT LISTING	REQUESTED LISTING
☑	Advisory Prerequisite (254 char) Election of an EECS, Master's Thesis Option. May be elected for a maximum of 6 credit hours	Advisory Prerequisite (254 char) Election of a CSE, Master's Thesis Option. May be elected for a maximum of 6 credit hours.
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☑

Course Components
- ☐ Lecture
- ☐ Seminar
- ☐ Recitation
- ☐ Lab
- ☐ Discussion
- ☑ Independent Study

Graded Component
- ☐
- ☐
- ☐
- ☐
- ☐
- ☑

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☑ Spring
- ☑ Summer
- ☑ Spring/Summer

Cognizant Faculty Member Name: Emily Mower Provost Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone:647-1754

CoE Curriculum Committee Representative:		Print: Amir Kamil	Date:6/12/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Emily Mower Provost	Date:6/12/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	**Requested:**
Course Description To be elected by EE and EES students pursuing the master's thesis option. May be taken more than once up to a total of 6 credit hours. To be graded on a satisfactory/unsatisfactory basis ONLY.	Course Description To be elected by CSE students pursuing the master's thesis option. May be taken more than once up to a total of 6 credit hours. To be graded on a satisfactory/unsatisfactory basis ONLY.
Class Length Full term	Class Length Full term
Contact hours (lecture):	Contact hours (lecture):
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-24
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 699	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 699
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☑	Course Title (full title) Research Work EECS	Course Title (full title) Research Work in CSE
☑	Abbreviated Title (20 char) Res Work in EECS	Abbreviated Title (20 char) Res Work CSE
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Students working under the supervision of a faculty member plan and execute a research project. A formal report must be submitted. May be taken for credit more than once up to a total of 6 credit hours. To be graded satisfactory/ unsatisfactory ONLY.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 1 Undergraduate Max: Graduate Max: 6	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☑ Course is Repeatable for Credit Maximum number of repeatable credits: 999	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 699

☐

Grading Basis
- ☐ Graded (A – E)
- ☐ Credit/No Credit
- ☑ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) Graduate standing and permission of instructor.	Advisory Prerequisite (254 char) Graduate standing and permission of instructor.
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components / Graded Component
- ☐ Lecture ☐
- ☐ Seminar ☐
- ☐ Recitation ☐
- ☐ Lab ☐
- ☐ Discussion ☐
- ☑ Independent Study ☑

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☑ Spring
- ☑ Summer
- ☑ Spring/Summer

Cognizant Faculty Member Name: Emily Mower Provost Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email:vyas@umich.edu Phone:734-647-1754

CoE Curriculum Committee Representative:		Print: Amir Kamil	Date: 5/24/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Emily Mower Provost	Date: 5/24/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Students working under the supervision of a faculty member plan and execute a research project. A formal report must be submitted. May be taken for credit more than once up to a total of 6 credit hours. To be graded satisfactory/ unsatisfactory ONLY.	Course Description Students working under the supervision of a faculty member plan and execute a research project. A formal report must be submitted. May be taken for credit more than once up to a total of 6 credit hours. To be graded satisfactory/ unsatisfactory ONLY.
Class Length Full term	Class Length Full term
Contact hours (lecture):	Contact hours (lecture):
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-13
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 700	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 700
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Special Topics in System Theory	Course Title (full title) Special Topics in System Theory
☐	Abbreviated Title (20 char) Spc Topc Sys Thry	Abbreviated Title (20 char) Spc Topc Sys Thry
☑	Course Description (Please limit to 50 words and attach separate sheet if necessary) Special topics of current interest in system theory.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 1 Undergraduate Max: Graduate Max: 16	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 700

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) Permission of instructor (to be arranged)	Advisory Prerequisite (254 char) Permission of instructor (to be arranged)
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Heath Hofmann Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email:nslowey@umich.edu Phone: 763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date:7/20/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date:7/20/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description	Course Description Special topics of current interest in system theory.
Class Length Full term	Class Length Full term
Contact hours (lecture): 1 - 16	Contact hours (lecture): 1 - 16
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-13
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 720	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 720
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Special Topics in Solid-State Devices, Integrated Circuits, and Physical Electronics	Course Title (full title) Special Topics in Solid-State Devices, Integrated Circuits, and Physical Electronics
☐	Abbreviated Title (20 char) Topic S-State Dev	Abbreviated Title (20 char) Topic S-State Dev
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Special topics of current interest in solid-state devices, integrated circuits, microwave devices, quantum devices, noise, plasmas. This course may be taken for credit more than once.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 1 Undergraduate Max: Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 720

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) Permission of instructor	Advisory Prerequisite (254 char) Permission of instructor
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions
☐	Course Components / Graded Component ☑ Lecture ☑ ☐ Seminar ☐ ☐ Recitation ☐ ☐ Lab ☐ ☐ Discussion ☐ ☐ Independent Study ☐ Terms Typically Offered ☐ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer	

Cognizant Faculty Member Name: Yogesh Gianchandani Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:	Print: Achilleas Anastasopoulos	Date: 7/19/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair:	Print: Heath Hofmann	Date: 7/19/23
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Special topics of current interest in solid-state devices, integrated circuits, microwave devices, quantum devices, noise, plasmas. This course may be taken for credit more than once.	Course Description Special topics of current interest in solid-state devices, integrated circuits, microwave devices, quantum devices, noise, plasmas. This course may be taken for credit more than once.
Class Length Full term	Class Length Full term
Contact hours (lecture): 1 - 4	Contact hours (lecture): 1 - 4
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

1210 LSA Building
500 S. State Street
Ann Arbor, MI 48109-1382
Phone: 734.763.2113
Fax: 734.936.3148
ro.curriculum@umich.edu
ro.umich.edu

Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-13
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 730	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 730
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Special Topics in Electromagnetics	Course Title (full title) Special Topics in Electromagnetics
☐	Abbreviated Title (20 char) Top Electromagnet	Abbreviated Title (20 char) Top Electromagnet
☑	Course Description (Please limit to 50 words and attach separate sheet if necessary) Special topics of current interest in electromagnetics.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 1 Undergraduate Max: Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 730

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

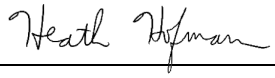
	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) Permission of instructor	Advisory Prerequisite (254 char) Permission of instructor
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☐ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Kamal Sarabandi Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:	Print: Achilleas Anastasopoulos	Date: 8/4/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: 	Print: Heath Hofmann	Date: 8/4/23
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description	Course Description Special topics of current interest in electromagnetics.
Class Length Full term	Class Length Full term
Contact hours (lecture): 1 - 4	Contact hours (lecture): 1 - 4
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

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☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-13
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 735	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 735
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Special Topics in the Optical Sciences	Course Title (full title) Special Topics in the Optical Sciences
☐	Abbreviated Title (20 char) Topic Optical Sci	Abbreviated Title (20 char) Topic Optical Sci
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Key topics of current research interest in ultrafast phenomena, short wavelength lasers, atomic traps, integrated optics, nonlinear optics and spectroscopy. This course may be taken for credit more than once under different instructors.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 1 Undergraduate Max: Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 735

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char) Graduate standing and permission of instructor.	Advisory Prerequisite (254 char) Graduate standing and permission of instructor.
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components
- ☐ Lecture
- ☑ Seminar
- ☐ Recitation
- ☐ Lab
- ☐ Discussion
- ☐ Independent Study

Graded Component
- ☐
- ☑
- ☐
- ☐
- ☐
- ☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Heath Hofmann Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum

Committee Representative: Print: Achilleas Anastasopoulos Date: 7/20/23

CoE Curriculum Committee Chair: Print: Date:

Home Department Chair: Print: Heath Hofmann Date: 7/20/23

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	**Requested:**
Course Description Key topics of current research interest in ultrafast phenomena, short wavelength lasers, atomic traps, integrated optics, nonlinear optics and spectroscopy. This course may be taken for credit more than once under different instructors.	Course Description Key topics of current research interest in ultrafast phenomena, short wavelength lasers, atomic traps, integrated optics, nonlinear optics and spectroscopy. This course may be taken for credit more than once under different instructors.
Class Length Full term	Class Length Full term
Contact hours (lecture): 1 - 4	Contact hours (lecture): 1 - 4
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-14
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 750	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 750
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Special Topics in Communication and Information Theory	Course Title (full title) Special Topics in Communication and Information Theory
☐	Abbreviated Title (20 char) Top Comm&Inf Thry	Abbreviated Title (20 char) Top Comm&Inf Thry
☑	Course Description (Please limit to 50 words and attach separate sheet if necessary) Special topics of current interest related to communication and information theory.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 1 Undergraduate Max: Graduate Max: 16	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 750

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) Permission of instructor.	Advisory Prerequisite (254 char) Permission of instructor.
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☑ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Heath Hofmann Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative: Print: Achilleas Anastasopoulos Date:7/20/23

CoE Curriculum Committee Chair: Print: Date:

Home Department Chair: Print: Heath Hofmann Date:7/20/23

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description	Course Description Special topics of current interest related to communication and information theory.
Class Length Full term	Class Length Full term
Contact hours (lecture): 1 - 16	Contact hours (lecture): 1 - 16
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-14
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 755	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 755
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Special Topics in Signal Processing	Course Title (full title) Special Topics in Signal Processing
☐	Abbreviated Title (20 char) Topics Signal Proc	Abbreviated Title (20 char) Topics Signal Proc
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Advanced topics in Signal and/or image processing. The specific topics vary with each offering.	
☐	Full Term Credit Hours Undergraduate Min: 1 Graduate Min: 1 Undergraduate Max: 4 Graduate Max: 4	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 755

☐

Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char) Permission of instructor	Advisory Prerequisite (254 char) Permission of instructor
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components	Graded Component
☑ Lecture	☑
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☐ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Jeffrey Fessler Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum

Committee Representative: Print: Achilleas Anastasopoulos Date:7/20/23

CoE Curriculum Committee Chair: Print: Date:

Home Department Chair: Print: Heath Hofmann Date:7/20/23

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	**Requested:**
Course Description Advanced topics in Signal and/or image processing. The specific topics vary with each offering.	Course Description Advanced topics in Signal and/or image processing. The specific topics vary with each offering.
Class Length Full term	Class Length Full term
Contact hours (lecture): 1 - 4	Contact hours (lecture): 1 - 4
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:
Tech Elective

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-14
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 760	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 760
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Special Topics in Control Theory	Course Title (full title) Special Topics in Control Theory
☐	Abbreviated Title (20 char) Topc Control Thry	Abbreviated Title (20 char) Topc Control Thry
☑	Course Description (Please limit to 50 words and attach separate sheet if necessary) Special topics of current interest related to control theory.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 1 Undergraduate Max: Graduate Max: 16	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 760

☐ Grading Basis
- ☑ Graded (A – E)
- ☐ Credit/No Credit
- ☐ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char) Permission of instructor.	Advisory Prerequisite (254 char) Permission of instructor.
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

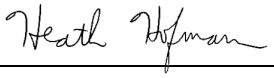
Course Components	Graded Component
☑ Lecture	☑
☑ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☐ Independent Study	☐

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☐ Spring
- ☐ Summer
- ☐ Spring/Summer

Cognizant Faculty Member Name: Heath Hofmann Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 8/4/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 8/4/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description	Course Description Special topics of current interest related to control theory.
Class Length Full term	Class Length Full term
Contact hours (lecture): 1 - 16	Contact hours (lecture): 1 - 16
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

Course Approval Request Form

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☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-14
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 765	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 765
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐		
☐	Course Title (full title) Special Topics in Stochastic Systems and Control	Course Title (full title) Special Topics in Stochastic Systems and Control
☐	Abbreviated Title (20 char) Stoch Sys Con	Abbreviated Title (20 char) Stoch Sys Con
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Advanced topics on stochastic systems such as stochastic calculus, nonlinear filtering, stochastic adaptive control, decentralized control and queuing networks.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 3 Undergraduate Max: Graduate Max: 3	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 765

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) Permission of instructor.	Advisory Prerequisite (254 char) Permission of instructor.
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Heath Hofmann Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum

Committee Representative: Print: Achilleas Anastasopoulos Date: 7/20/23

CoE Curriculum Committee Chair: Print: Date:

Home Department Chair: Print: Heath Hofmann Date: 7/20/23

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

Cross-Listed Department Chair: Print: Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	**Requested:**
Course Description Advanced topics on stochastic systems such as stochastic calculus, nonlinear filtering, stochastic adaptive control, decentralized control and queuing networks.	Course Description Advanced topics on stochastic systems such as stochastic calculus, nonlinear filtering, stochastic adaptive control, decentralized control and queuing networks.
Class Length Full term	Class Length Full term
Contact hours (lecture): 3	Contact hours (lecture): 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

1210 LSA Building
500 S. State Street
Ann Arbor, MI 48109-1382
Phone: 734.763.2113
Fax: 734.936.3148
ro.curriculum@umich.edu
ro.umich.edu

Course Approval Request Form

Office of the Registrar, University of Michigan

☑ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-07-14
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 820	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 820
☐	☐ Course is Cross-Listed with Other Departments	☐ Course is Cross-Listed with Other Departments
☐	Department / Subject / Catalog Number	Department / Subject / Catalog Number
☐	Course Title (full title) Seminar in Solid-State Electronics	Course Title (full title) Seminar in Solid-State Electronics
☐	Abbreviated Title (20 char) Sem S-S Elec	Abbreviated Title (20 char) Sem S-S Elec
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Advanced graduate seminar devoted to discussing current research topics in areas of solid-state electronics. Specific topics vary each time the course is offered. Course may be elected more than once.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 1 Undergraduate Max: Graduate Max: 1	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☐ Course is Repeatable for Credit Maximum number of repeatable credits:	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 820

☐	Grading Basis ☑ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

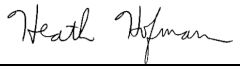
	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) Graduate standing and permission of instructor.	Advisory Prerequisite (254 char) Graduate standing and permission of instructor.
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐	Course Components ☑ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☐ Independent Study	Graded Component ☑ ☐ ☐ ☐ ☐ ☐	Terms Typically Offered ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Summer

Cognizant Faculty Member Name: Heath Hofmann Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305

CoE Curriculum Committee Representative:		Print: Achilleas Anastasopoulos	Date: 7/20/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Heath Hofmann	Date: 7/20/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Advanced graduate seminar devoted to discussing current research topics in areas of solid-state electronics. Specific topics vary each time the course is offered. Course may be elected more than once.	Course Description Advanced graduate seminar devoted to discussing current research topics in areas of solid-state electronics. Specific topics vary each time the course is offered. Course may be elected more than once.
Class Length Full term	Class Length Full term
Contact hours (lecture): 1	Contact hours (lecture): 1
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-16
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 990	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 990
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Dissertation/Pre-Candidate	Course Title (full title) Dissertation/Pre-Candidate
☐	Abbreviated Title (20 char) Diss-Precand	Abbreviated Title (20 char) Diss-Precand
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Dissertation work by doctoral student not yet admitted to status as candidate. The defense of the dissertation, that is, the final oral examination, must be held under a full-term candidacy enrollment.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 1 Undergraduate Max: Graduate Max: 8	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☑ Course is Repeatable for Credit Maximum number of repeatable credits: 999	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 990

☐	Grading Basis ☐ Graded (A – E) ☐ Credit/No Credit ☑ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Grading ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only Add Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent

	CURRENT LISTING	REQUESTED LISTING
☐	Advisory Prerequisite (254 char): Election for dissertation work by doctoral student not yet admitted as a Candidate.	Advisory Prerequisite (254 char): Election for dissertation work by doctoral student not yet admitted as a Candidate.
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions
☑	Course Components ☐ Lecture ☐ Seminar ☐ Recitation ☐ Lab ☐ Discussion ☑ Independent Study Graded Component ☐ ☐ ☐ ☐ ☐ ☑ Terms Typically Offered ☑ Fall ☑ Winter ☑ Spring ☑ Summer ☑ Spring/Summer	

Cognizant Faculty Member Name: Emily Mower Provost Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 734-647-1754

CoE Curriculum Committee Representative:		Print: Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
Course Description Dissertation work by doctoral student not yet admitted to status as candidate. The defense of the dissertation, that is, the final oral examination, must be held under a full-term candidacy enrollment.	Course Description Dissertation work by doctoral student not yet admitted to status as candidate. The defense of the dissertation, that is, the final oral examination, must be held under a full-term candidacy enrollment.
Class Length Full term	Class Length Full term
Contact hours (lecture):	Contact hours (lecture):
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by:
Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:
The EECS department is moving most 500-level and above courses to separate CSE and ECE subject codes to free up course numbers, and to better reflect which division is the home for each course.

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Action Requested
- ☐ New Course
- ☑ Modification of Existing Course
- ☐ Deletion of Existing Course

Date of Submission: 2023-05-24
Effective Term: Fall 2024

☑	Course Offered ☑ Indefinitely ☐ One term only	**RO USE ONLY** Date Received: Date Completed: Completed By:

	CURRENT LISTING	**REQUESTED LISTING**
☑	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 995	Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 995
☐	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number	☐ Course is Cross-Listed with Other Departments Department / Subject / Catalog Number
☐	Course Title (full title) Dissertation/Candidate	Course Title (full title) Dissertation/Candidate
☐	Abbreviated Title (20 char) Diss-Cand	Abbreviated Title (20 char) Diss-Cand
☐	Course Description (Please limit to 50 words and attach separate sheet if necessary) Election for dissertation work by a doctoral student who has been admitted to candidate status. The defense of the dissertation, that is, the final oral examination, must be held under a full-term candidacy enrollment.	
☐	Full Term Credit Hours Undergraduate Min: Graduate Min: 4 Undergraduate Max: Graduate Max: 8	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:
☐	Course Credit Type Rackham Graduate Student	
☐	Repeatability ☑ Course is Repeatable for Credit Maximum number of repeatable credits: 999	☐ Course is Y graded ☐ Can be taken more than once in the same term

Subject: Elec Engin & Computer Sci Catalog: 995

☐

Grading Basis
- ☐ Graded (A – E)
- ☐ Credit/No Credit
- ☑ Satisfactory/Unsatisfactory
- ☐ Pass/Fail
- ☐ Business Administration

Grading
- ☐ Not for Credit
- ☐ Not for Degree Credit
- ☐ Degree Credit Only

Add Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

Drop Consent
- ☐ Department Consent
- ☐ Instructor Consent
- ☑ No Consent

	CURRENT LISTING	**REQUESTED LISTING**
☐	Advisory Prerequisite (254 char) Graduate School authorization for admission as a doctoral candidate.	Advisory Prerequisite (254 char) Graduate School authorization for admission as a doctoral candidate.
☐	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:
☐	Credit Exclusions	Credit Exclusions

☐

Course Components	Graded Component
☐ Lecture	☐
☐ Seminar	☐
☐ Recitation	☐
☐ Lab	☐
☐ Discussion	☐
☑ Independent Study	☑

Terms Typically Offered
- ☑ Fall
- ☑ Winter
- ☑ Spring
- ☑ Summer
- ☑ Spring/Summer

Cognizant Faculty Member Name: Emily Mower Provost Cognizant Faculty Member Title:

SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)

Contact Person: Punam Vyas Email: vyas@umich.edu Phone:647-1754

CoE Curriculum Committee Representative:		Print: Amir Kamil	Date:
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:		Print: Emily Mower Provost	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	**Requested:**
Course Description Election for dissertation work by a doctoral student who has been admitted to candidate status. The defense of the dissertation, that is, the final oral examination, must be held under a full-term candidacy enrollment.	Course Description Election for dissertation work by a doctoral student who has been admitted to candidate status. The defense of the dissertation, that is, the final oral examination, must be held under a full-term candidacy enrollment.
Class Length Full term	Class Length Full term
Contact hours (lecture):	Contact hours (lecture):
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

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