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 <u>carmonam@umich.edu</u>.

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	с	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	с	YES	APPROVED		

CARF SUMMARIES

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PAGE	SUBJECT	COURSE #	ACTION	SUMMARY	EFFECTIVE TERM	MIN. GRADE REQ. FOR ENF. PREPREQ	IS COURSE ON LSA COURSE GUIDE?	APPROVED	NOTES & REVISIONS	TABLED
28	EECS	461	MOD	Change to Enforced Prerequisite	WT 2024	с	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	с	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	С	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	С	YES	APPROVED		
74	EECS	508	MOD		FT 2024	С	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.	

PAGE	SUBJECT	COURSE #	ACTION	SUMMARY	EFFECTIVE TERM	MIN. GRADE REQ. FOR ENF. PREPREQ	IS COURSE ON LSA COURSE GUIDE?	APPROVED	NOTES & REVISIONS	TABLED
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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PAGE	SUBJECT	COURSE #	ACTION	SUMMARY	EFFECTIVE TERM	MIN. GRADE REQ. FOR ENF. PREPREQ	IS COURSE ON LSA COURSE GUIDE?	APPROVED	NOTES & REVISIONS	TABLED
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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PAGE	SUBJECT	COURSE #	ACTION	SUMMARY	EFFECTIVE TERM	MIN. GRADE REQ. FOR ENF. PREPREQ	IS COURSE ON LSA COURSE GUIDE?	APPROVED	NOTES & REVISIONS	TABLED
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		

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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		

PAGE	SUBJECT	COURSE #	ACTION	SUMMARY	EFFECTIVE TERM	MIN. GRADE REQ. FOR ENF. PREPREQ	IS COURSE ON LSA COURSE GUIDE?	APPROVED	NOTES & REVISIONS	TABLED
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 SUMM	IARIES							-
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.	



Course Approval Request Form

Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested						
	New Course Modification of Existing	Date of Submission: 2023-05-05					
	Course	Effective Term: Winter 2024					
		RO USE ONLY					
	Course Offered	Date Received:					
	✓ Indefinitely	Date Completed:					
		Completed By:					

CURRENT LISTING

	CURRENT LISTING	ì		REQUESTED LISTING					
N	Dept (Home): Subject: Catalog:			Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 527					
	Course is Cr	ross-Listed with Oth	ner Departments	Course is Cross-Listed with Other Departments					
	Department	Subject	Catalog Number	Department	Subject	Catalog Number			
Ŋ	Course Title (full ti	itle)		Course Title (full ti	tle)				
		(Abbroviated Title (20 char)					
	Abbreviated Title ((20 char)		Abbreviated Title (20 char)				
				Power Semi	con Device				
R	Course Description Introduction IGBT, HEMT, thyris fabrication, packag device performance	n (Please limit to 50 n to power semicon stor, Schottky diode ging, and thermal n ce.	words and attach se ductor devices. Anal , PiN diode, and eme nodeling. Use of com	eparate sheet if nece ysis of DC and switc rging devices. Powe mercial numerical s	essary) hing behavior of p r semiconductor r imulation softwar	ower MOSFETs, naterials, device e to model power			
	Full Term Credit H	ours		Half Term Credit H	ours				
	Undergraduate Mi	in: 4 Graduat	te Min: 4	Undergraduate Mi	n: Gradua	ate Min:			
	Undergraduate Ma	ax: 4 Graduat	te Max: 4	Undergraduate Ma	ax: Gradua	ate Max:			
	Course Credit Type Undergraduate	e Student, Rackham (Graduate Student, N	Non-Rackham Graduate Student					
	Repeatability								
	🗆 Course is Rep	eatable for Credit		Course is Y graded					
	Maximum number	r of repeatable crec	lits:	\Box Can be taken more than once in the same term					

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500 S. State Street

Ann Arbor, MI 48109-1382

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Sub	ject: Catalog:					
Ŋ	Grading Basis ✓ Graded (A – E) □ Credit/No Credit □ Satisfactory/Unsatisfact □ Pass/Fail □ Business Administration Grading □ Not for Credit □ Not for Degree Credit □ Degree Credit Only	ory Add Consent Department Instructor Co No Consent	Consent onsent	Drop Consent Department C Instructor Con No Consent	onsent sent	
	CURRENT LISTING		REQUESTED L	ISTING		
	Advisory Prerequisite (254 ch	nar)	Advisory Prere	equisite (254 char)		
	Enforced Prerequisite (254 ch Minimum grade requirement	nar) ::	Enforced Prere EECS 320 permission of Minimum grad	equisite (254 char) or EECS 421 or graduate the instructor	standing	or
	Credit Exclusions		Credit Exclusio	ons		
Ŋ	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Compone	ent	Terms Typically Off ✓ Fall ✓ Winter □ Spring □ Summer □ Spring/Summer	ered	
Cog	nizant Faculty Member Name:	Becky Peterson	Cognizant Fac	ulty Member Title:		
SIGI Con	NATURES ARE REQUIRED FROM tact Person: Punam Vyas	M ALL DEPARTMENTS INVOL Email: vyas@umich.e	VED (Please Prin du	t AND Sign Name) Phone: 647-1754		
CoE Com	Curriculum nmittee Representative:	Achilleas Anastasopoulo	∫ Print: Ach	illeas Anastasopoulos	Date:	5/24/23
CoE	Curriculum Committee Chair:		Print:		Date:	
Hon	ne Department Chair:	Heath Upm	Print:Heat	h Hofmann	Date:	5/5/23
Cros	ss-Listed Department Chair:	/	Print:		Date:	

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Print:

Print:

Date:

Date:

Cross-Listed Department Chair:

Cross-Listed Department Chair:

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	<u>Class Length</u> Full term
Contact hours (lecture):	<u>Contact hours (lecture):</u> 3
Contact hours (recitation)	<u>Contact hours (recitation)</u> 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 & amp; Energy Area, it can count as a Major Area course after approval by an advisor.

<u>Special resources of facilities required for this course:</u> 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, <u>blpeters@umich.edu</u>
- 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 <u>here</u>.
- 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 Discussions are held **Fridays at 1:30-2:30pm** or **2:30-3:30pm in 104 EWRE**. Sections: 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 If you are ill, please stay home and, insofar as your health allows, join lectures, Policy 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 <u>https://umich.zoom.us/j/96100936889</u>, 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
- Supplemental (Chapter 7 only) B. El-Kareh and L. N. Hutter, *Silicon Analog Components*, Textbooks 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

A hardcopy is also on reserve in AAEL.

(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, <u>https://search.lib.umich.edu/catalog/record/990085824500106381</u> (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) <u>https://onlinelibrary.wiley.com/doi/book/10.1002/0470068329</u>

Online textbook Note: you must be on campus, or use VPN, or use the proxy to download the books. For information on U-M VPN: <u>https://its.umich.edu/enterprise/wifi-networks/vpn/getting-started</u>. To use the proxy, see the instructions here <u>https://www.lib.umich.edu/find-borrow-request/access-online-resources/remote-access/using-browser-bookmark</u>. 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 We will use CAEN-based device simulation softwares Silvaco and Sentaurus. Software: 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. https://caen.engin.umich.edu/software/licensing/access-to-synopsys-See tools/ for details.

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

- Grading: Homeworks (five, each 5.6%) 28% Weekly Lecture Quizzes: (12 each @ 1%) 12% Discussion Attendance and Participation (12 each (a) 0.5%) 6% Simulation Project 1 18% • 18% Simulation Project 2 • 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. The purpose of homework is to learn. I strongly encourage you to discuss Homework: 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 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 <u>one</u> 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
 All graded work this semester will be submitted online. For Homework and Simulation projects, pdf format with total document size < 20 MB is required.
 Procedure:
 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 <u>Notes app</u>, video here: <u>iPhone</u> (2:46). Android devices can scan documents directly using the <u>Google Drive app</u>, video here: <u>Android</u> (2:15)

Honor Code
Statement:
All work in this class shall be in accordance with the College of Engineering's Honor Code (<u>https://elc.engin.umich.edu/honor-council/</u>). 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, <u>per University guidance</u> .						
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; <u>http://ssd.umich.edu</u>) 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 <u>Prohibited Conduct</u> , 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						
	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 <u>Prohibited</u> <u>Conduct</u> 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	Michigan Engineering C.A.R.E. Center, https://care.engin.umich.edu/
For Students	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 (<u>CAPS</u>) (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 (<u>SAPAC</u>) (24 hour emergency) 734-936-333; (non-emergency) 734-764-7771
- <u>Avalon Healing Center</u> (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 <u>incident report form</u>. The University strongly encourages the prompt reporting of these types of allegations. For additional information, including confidential and non-confidential resources, please visit this <u>website</u>.
- For situations involving student conflicts or alleged violations of the <u>student statement of responsibilities</u>, please visit the <u>Office of Student Conflict Resolution report form</u>.

(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 & PiN Rectifiers 4		Baliga Chapters 4, 5	Weekly Lecture Quizzes			
package Thermal Substrate	Thermal Effects and Packaging Substrates & Device Fabrication	Lectures Notes	Simulation Project 1			
	MOSFET Review Vertical Power MOSFET	Baliga Chapter 6	Weekly Lecture Quizzes Homework 3 Simulation Project 2			
3: Unipolar Transistors	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

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	Ν	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	Ν	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	А	Ν	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)		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	А	Ν	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.



Course Approval Request Form

Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested			
	□ New Course	Date of Submission: 2023-06-15		
ע רט		Effective Term: Winter 2024		
	Deletion of Existing Course			
	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY		
		Date Received:		
		Date Completed:		
		Completed By:		

CURRENT USTING

	CURRENT LISTING	i		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			Course is Cross-Listed with Other Departments				
	Department	Subject	Catalog Number	Department	Subject	Catalog Number		
	Course Title (full title) Principles of Machine Learning			Course Title (full title)				
				Principles of Machine Learning				
	Abbreviated Title (20 char)			Abbreviated Title (20 char)				
	Principles of	fML		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 H	ours		Half Term Credit H	ours			
	Undergraduate M	in: 4 Graduat	e Min: 4	Undergraduate Mi	n: Graduat	e Min:		
	Undergraduate Ma	ax: 4 Graduat	e Max: 4	Undergraduate Ma	ax: Graduat	e Max:		
	Course Credit Type Undergraduate	e Student, Rackham G	Graduate Student, N	Non-Rackham Graduate Student				
	Repeatability							
	Course is Repeated to Course is Repated to Course is Repeated t	eatable for Credit		Course is Y graded				
	Maximum number of repeatable credits:			Can be taken more than once in the same term				

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

			26
Sub	ject: Elec Engin & Computer Sci Cat	alog: 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

	CURRENT LISTING		REQUESTED LISTING					
	Advisory Prerequisite (254 char)		Advisory Prerequisite (254 char)					
	Enforced Prerequisite (254 char) EECS 280 and (STATS 250 or STAT or STATS 426 or EECS 301 or IOE 265 or (EECS 351 or MATH 214 or 217 or 296 ROB 101). (C or better, No OP/F). Minimum grade requirement: C	S 280 or STATS 412 or TO 301) and or 417 or 419 or	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					
Ø	Credit Exclusions No credit to a student who has ta	aken EECS 445	Credit Exclusions No credit to a student who has taken EECS 445 or 545 or 553					
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componer	nt Terms Typically Offered ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer					
Cog	nizant Faculty Member Name: Qing Qu		Cognizant Faculty Member Title:					
SIGN Cont	GNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name) ontact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305							

CoE Curriculum Committee Representative: Achilleas Anastasopou	Print: Achilleas Anastasopoulos	Date: 8/14/2023
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair:	Chai Mun 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:

Current:

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

Contact hours (lecture): 3

Contact hours (recitation)
1

Contact hours (lab)

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.

Class Length Full term

Contact hours (lecture): 3

Contact hours (recitation)
1

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.



Course Approval Request Form

Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested			
	□ New Course ☑ Modification of Existing	Date of Submission: 2023-04-13		
Course		Effective Term: Winter 2024		
	Deletion of Existing Course			
	Course Offered	RO USE ONLY		
		Date Received:		
КI	 Indefinitely One term only 	Date Completed:		
		Completed By:		

CURRENT LISTING

	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		Catalog Number	Department	Subject	Catalog Number		
	I							
	Course Title (full title) Embedded Control Systems			Course Title (full title)				
				Embedded Control Systems				
	Abbreviated Title (20 char)			Abbreviated Title (20 char)				
	Embedded (Control		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							
	Full Term Credit H			Half Term Credit H	ours			
п	Undergraduate Mi	in:4 Graduat	e Min· 4	Undergraduate Mi	n: Graduati	∍ Min∙		
	Undergraduate Ma	ax: 4 Graduat	e Max: 4	Undergraduate Max: Graduate Max:		e Max:		
	Course Credit Type	2		~				
Ш	Undergraduate	Student, Rackham G	Graduate Student					
	Repeatability							
	Course is Repeared	eatable for Credit		Course is Y graded				
Ш	Maximum number of repeatable credits:			\Box Can be taken more than once in the same term				

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28

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Ann Arbor, MI 48109-1382

Phone: 734.763.2113

Fax: 734.936.3148

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Sub	ject: Elec Engin & Computer Sci Cata	alog: 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 Co Instructor Cons No Consent 	Drop Consent Consent			
	CURRENT LISTING		REQUESTED LISTING			
	Advisory Prerequisite (254 char)		Advisory Prerequisite (254 char)			
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)			
V	graduate standing) ()P/F) or	EECS 216; (C or better, No OP/F) or graduate standing			
	Minimum grade requirement: C		Minimum grade requirement: C			
	Credit Exclusions		Credit Exclusions			
	Course Components	Graded Component	t			

	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Comp	oonent □ 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	3-2305
CoE Curriculum Committee Repres	entative: Achilled	as Anastas	sopoulos	Print:	Achilleas Anastasopoulos	Date: 8/14/2023
CoE Curriculum Co	mmittee Chair:			Print:		Date:
Home Department	Chair:	Sha; Apri	n	Print:	Shai Revzen for Dennis Sylvester	Date: 2023-08-14
Cross-Listed Depar	tment Chair:			Print:		Date:
Cross-Listed Depar	tment Chair:			Print:		Date:
Cross-Listed Depar	tment Chair:			Print:		Date:

DEPARTMENTAL/COLLEGE USE ONLY

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

Contact hours (lab)

1

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:

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.



WTCourse Approval Request Form

Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on 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

CURRENT LISTING			REQUESTED LISTING		
Dept (Home): Industrial & Operations Engin Subject: IOE Catalog: 310			Dept (Home): Industrial & Operations Engin Subject: IOE Catalog: 310		
🗆 Course is Cr	ross-Listed with Oth	er Departments	🗆 Course is C	ross-Listed with Oth	er Departments
Department	Subject	Catalog Number	Department	Subject	Catalog Number
Course Title (full title)			Course Title (full title)		
Optimization and Computational Methods		Optimization and Computational Methods			
Abbreviated Title (20 char)			Abbreviated Title (20 char)		
Optim and C	Comp Meth		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 H	ours		Half Term Credit H	ours	
Undergraduate Mi	in: 3 Graduat	e Min:	Undergraduate Mi	n: Graduat	e Min:
Undergraduate Ma	ax: 3 Graduat	e Max:	Undergraduate Ma	ax: Graduat	e Max:
Course Credit Type Undergraduate	e Student				
Repeatability					
Course is Repeatable for Credit			Course is Y graded		
Maximum number of repeatable credits:			\Box Can be taken more than once in the same term		

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1210 LSA Building

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Phone: 734.763.2113

Fax: 734.936.3148

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Sub	ject: 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 (□ Instructor Co ☑ No Consent	Consent nsent	Drop Consent Department Consent Instructor Consent No Consent
	CURRENT LISTING		REQUESTED	LISTING
	Advisory Prerequisite (254 char)		Advisory Prei	requisite (254 char)
	Enforced Prerequisite (254 char)		Enforced Pre	requisite (254 char)
	(MATH 214 or 216 or 256 or 286 or 316) and (IOE 202)		(MATH 214 or 216 or 256 or 286 or 316 or ROB 101) and	
	and (ENGR 101 or 101X or 104 or 151 or EECS 100 or 183		(IOE 202) and (ENGR 101 or 101X or 104 or 151 or EECS	

¥	or CMPTRSC 100 or 183); (C- or better) Minimum grade requirement: C-	FEECS 100 0F 183	100 or 183 or CMPTRSC 100 or 1 Minimum grade requirement: C	L83); (C- or better)
	Credit Exclusions		Credit Exclusions	
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componer	tt Terms Typica ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Su	ally Offered ummer
Cog	nizant Faculty Member Name: Amy Cohn	I	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	Janning Brozen	Print: Yavuz Bozer	Date:05/24/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair: Brian Denton	Bin Duton	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:

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Current:

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

Contact hours (lecture): 3

Contact hours (recitation)

Contact hours (lab)

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.

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: 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.



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

	CURRENT LISTING			REQUESTED LISTING		
	Dept (Home): Industrial & Operations Engin Subject: IOE Catalog: 333			Dept (Home): Industrial & Operations Engin Subject: IOE Catalog: 333		
	🗆 Course is Cr	ross-Listed with Oth	er Departments	🗆 Course is C	ross-Listed with Oth	er Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	itle)		Course Title (full title)		
	Human Fact	ors and Ergonomics		Human Factors and Ergonomics		
	Abbreviated Title (20 char)			Abbreviated Title (20 char)		
Human Factors Ergo			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					
	Full Term Credit H		scusseu.	Half Torm Credit H	ours	
	Lindergraduate Mi	in:3 Graduat	e Min:	Lindergraduate Mi	n: Graduat	e Min:
	Undergraduate Ma	ax: 3 Graduat	e Max:	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type Undergraduate Student					
	Repeatability					
	Course is Repeatable for Credit			□ Course is Y graded		
	Maximum number of repeatable credits:			\Box Can be taken more than once in the same term		

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Sub	ect: Industrial & Operations Engin	Catalog: 333			35
	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 □ Instructor Co ☑ No Consent	Consent nsent	Drop Consent Department Instructor Co No Consent	: Consent onsent
	CURRENT LISTING		REQUESTE	DLISTING	
	Advisory Prerequisite (254 char) Preceded or accompanied by	IOE 265	Advisory Pr	erequisite (254 char)	
	Enforced Prerequisite (254 char) Minimum grade requirement: Credit Exclusions		Enforced Pr Precec Minimum g Credit Exclu	rerequisite (254 char) ded or accompanied by IO grade requirement: C- usions	E 265
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componen	lnt	Terms Typically C ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summ	offered
Cog	nizant Faculty Member Name: Yili Liu	J	Cognizant F	aculty Member Title: Prot	fessor
SIGI Con	NATURES ARE REQUIRED FROM ALL	DEPARTMENTS INVOLV	/ED (Please P du	r int AND Sign Name) Phone: 734-764-32	97
CoE Con	Curriculum mittee Representative: Yavuz Bozer	Hanning Geoscy	Print:	Yavuz Bozer	Date: 4/27/23
CoE	Curriculum Committee Chair:		Print:		Date:
Hon	ر ne Department Chair: Brian Denton	Brin Dut	Print:	Brian Denton	Date: 04/27/23
Cros	ss-Listed Department Chair:		Print:		Date:
Cros	ss-Listed Department Chair:		Print:		Date:
Cros	s-Listed Department Chair:		Print:		Date:

DEPARTMENTAL/COLLEGE USE ONLY

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

Additional Info:

Submitted by: Home dept

<u>Describe how this course fits with the degree requirements:</u> 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.


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
Ŋ	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
	Dept (Home): Industrial & Operations Engin Subject: IOE Catalog: 366		Dept (Home): Industrial & Operations Engin Subject: IOE Catalog: 366			
	🗆 Course is Cr	ross-Listed with Oth	er Departments	🗆 Course is C	ross-Listed with O	ther Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	itle)		Course Title (full ti	tle)	
	Introduction	n to Engineering Dat	a Analytics	Introduction to Engineering Data Analytics		
	Abbreviated Title ((20 char)		Abbreviated Title (20 char)		
	Intro Eng Da	ita Analy		Intro Eng Data Analy		
_	Course Description	n (Please limit to 50	words and attach se	eparate sheet if nece	essary)	
		to data analysis me	ethods and statistica	il tools, linear regres	sion and correlati	on, multiple linear
	of experiments.	se selection, nomin	ear regression, logis	lic regression, analys	sis of variance, int	roduction to design
	Full Term Credit Ho	ours		Half Term Credit Hours		
	Undergraduate Mi	in: 3 Graduat	e Min:	Undergraduate Mi	n: Gradu	ate Min:
Undergraduate Max: 3 Graduate Max:		e Max:	Undergraduate Ma	ax: Gradu	ate Max:	
	Course Credit Type Undergraduate Student					
	Repeatability			_		
	□ Course is Repeatable for Credit			Course is Y graded		
	Maximum number of repeatable credits:			\Box Can be taken more than once in the same term		

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			38
Subject: Industrial & Operations E	ngin Catalog: 366		
Grading Basis Graded (A − E) Credit/No Credit Satisfactory/Unsatisfact Pass/Fail Business Administratio Grading Not for Credit Not for Degree Credit Degree Credit Only	tory Add Consent Department n Dinstructor Co No Consent	: Consent onsent	Drop Consent Department Consent Instructor Consent No Consent
CURRENT LISTING		REQUESTED	LISTING
Advisory Prerequisite (254 c	har)	Advisory Prei	requisite (254 char)
Enforced Prerequisite (254 c (IOE 265 or STATS 265) and (286 or 316); (C- or better) Minimum grade requirement	har) MATH 214 or 216 or 256 or t: C-	Enforced Pre (IOE 265 or S 286 or 316 or Minimum gra	requisite (254 char) TATS 265) and (MATH 214 or 216 or 256 or r ROB 101); (C- or better) ade requirement: C-
Credit Exclusions		Credit Exclus	ions
Course Components Course Components Cecture Seminar Recitation Lab	Graded Compone	ent	Terms Typically Offered ☑ Fall ☑ Winter □ Spring

Cognizant Faculty Member Name: Eu	nshin Byon	Cognizant F
Independent Study		
Discussion		

Cognizant Faculty Member Title: Associate Professor

□ Summer

□ Spring/Summer

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	Harning Gross	Print: Yavuz Bozer	Date:05/12/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair: Brian Denton	Brin Duton	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 Course Description** Introduction to data analysis methods and statistical tools, Introduction to data analysis methods and statistical tools, linear regression and correlation, multiple linear linear regression and correlation, multiple linear regression, stepwise selection, nonlinear regression, regression, stepwise selection, nonlinear regression, logistic regression, analysis of variance, introduction to logistic regression, analysis of variance, introduction to design of experiments. design of experiments. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 3 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.



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested New Course Modification of Existing Course Polation 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

CURRENT LISTING			REQUESTED LISTING		
Dept (Home): Industrial & Operations Engin Subject: IOE Catalog: 422		Dept (Home): Subject: Catalog:			
Course is Cr	ross-Listed with Oth	er Departments	🗆 Course is C	ross-Listed wit	h Other Departments
Department	Subject	Catalog Number	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 s Engineering students will explore the dynamics of increasingly global economy. Creating a business plan or students to innovate; manage risk, stress and failure; con			eparate sheet if nece curning an innovative ginating in an intern front ethical problen r.	essary) e idea into a co ational setting ns: question cu	ommercial venture in an will: challenge ultural assumptions;
Full Term Credit H	ours	· · ·	Half Term Credit Hours		
Undergraduate Mi	in: 3 Graduat	e Min:	Undergraduate Mi	n: Gra	iduate Min:
Undergraduate Ma	ax: 3 Graduat	e Max:	Undergraduate Ma	ax: Gra	iduate Max:
Course Credit Type Undergraduate Student					
Repeatability					
Course is Rep	eatable for Credit		Course is Y graded		
Maximum number of repeatable credits:			\Box Can be taken more than once in the same term		

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Fax: 734.936.3148

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Subj	ect: Industrial & Operations Engin	Catalog: 422			41
	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 (□ Instructor Co ☑ No Consent	Consent nsent	Drop Consent Department Con Instructor Conse No Consent	sent nt
	CURRENT LISTING		REQUESTED LIS	STING	
	Advisory Prerequisite (254 char) Senior Standing		Advisory Preres	quisite (254 char)	
	Enforced Prerequisite (254 char)		Enforced Prere	quisite (254 char)	
	Minimum grade requirement:		Minimum grad	e requirement:	
	Credit Exclusions		Credit Exclusio	ns	
	Course Components	Graded Componer	nt	Terms Typically Offere ☑ Fall □ Winter □ Spring □ Summer □ Spring/Summer	ed
Cog	nizant Faculty Member Name: Debra	a Levantrosser	Cognizant Facu	lty Member Title: Lecturer	
SIGN Con	NATURES ARE REQUIRED FROM ALL	DEPARTMENTS INVOLV Email: lucajl@umich.ed	E D (Please Print du	AND Sign Name) Phone: 734-764-3297	
CoE Corr	Curriculum mittee Representative: Yavuz Bozer	Harning geosle	Print: Yav	uz Bozer	Date: 05/24/23
CoE	Curriculum Committee Chair:		Print:		Date:
Hon	ne Department Chair: Brian Denton	Brin Dute	之 Print: Bri	an Denton	Date: 05/25/202
Cros	s-Listed Department Chair:		Print:		Date:
Cros	s-Listed Department Chair:		Print:		Date:
Croc	s-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
<u>Contact hours (lecture):</u> 3	Contact hours (lecture):
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by: Home dept

<u>Describe how this course fits with the degree requirements:</u> 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

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



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested			
	New Course	Data of Submission: 2022 02 20		
	Modification of Existing	Date of Submission: 2023-03-30		
Course		Ellective lenni. Willter 2024		
	Deletion of Existing Course			
	Course Offered	RO USE ONLY		
Ŋ	✓ Indefinitely □ One term only	Date Received:		
		Date Completed:		
		Completed By:		

CURRENT LISTING

CURRENT LISTING			REQUESTED LISTING		
Dept (Home): Industrial & Operations Engin Subject: IOE Catalog: 474		Dept (Home): Industrial & Operations Engin Subject: IOE Catalog: 474			
🗆 Course is Cr	ross-Listed with Oth	er Departments	🗆 Course is C	ross-Listed with Oth	ner Departments
Department	Subject	Catalog Number	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 s Simulation of complex discrete-event systems with Course topics include modeling and programming simula ProModel or GSPP/H; input distribution modeling; analys			eparate sheet if nece applications in indus ions in one or more s of simulation outp	essary) strial and service org high-level compute ut data. The course	ganizations. r packages such as e will obtain a
Full Term Credit HoursUndergraduate Min: 4Graduate Min: 4Undergraduate Max: 4Graduate Max: 4		Half Term Credit HoursUndergraduate Min:Graduate Min:Undergraduate Max:Graduate Max:		e Min: e Max:	
Course Credit Type Undergraduate Student, Rackham Graduate Student					
Repeatability					
🗆 Course is Rep	eatable for Credit		Course is Y graded		
Maximum number of repeatable credits:			\Box Can be taken more than once in the same term		

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				44
Subj	ject: 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 Instructor Co No Consent 	Consent nsent	Drop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent
	CURRENT LISTING		REQUESTED I	ISTING
	Advisory Prerequisite (254 char)		Advisory Prer	equisite (254 char)
	Enforced Prerequisite (254 char)		Enforced Prer	requisite (254 char)
	IOE 316 and IOE 366 and IOE 3	73; C- or better OR	IOE 316 and IOE 366, preceded or accompanied by	
	Graduate Standing	-	IOE 373; C- or better OR Graduate Standing	
	Minimum grade requirement:		Minimum grade requirement: C-	

	Credit Exclusions		Credit Exclusions	
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componer	nt	Terms Typically Offered ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer
Cognizant Faculty Member Name: Luis Garcia-Guzman		rcia-Guzman	Cognizant Faculty I	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	Hamz Gozen	Print: Yavuz Bozer	Date: 4/27/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair: Brian Denton	Brin Duton	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
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Current:	Requested:
<u>Course Description</u>	<u>Course Description</u>
Simulation of complex discrete-event systems with	Simulation of complex discrete-event systems with
applications in industrial and service organizations.	applications in industrial and service organizations.
Course topics include modeling and programming	Course topics include modeling and programming
simulations in one or more high-level computer packages	simulations in one or more high-level computer packages
such as ProModel or GSPP/H; input distribution modeling;	such as ProModel or GSPP/H; input distribution modeling;
analysis of simulation output data. The course will obtain a	analysis of simulation output data. The course will obtain a
team simulation project.	team simulation project.
<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
4	4
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by: Home dept

<u>Describe how this course fits with the degree requirements:</u> 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



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	
Ŋ	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:	

CURRENT LISTING

	CURRENT LISTING		REQUESTED LISTING			
Ŋ	Dept (Home): Subject: Catalog:		Dept (Home): Robotics Subject: ROB Catalog: 450			
	🗆 Course is Cr	ross-Listed with Oth	er Departments	Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
N	Course Title (full ti	tle)		Course Title (full ti	tle)	
¥.				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)			essary)			
	The primary	goal of this course	is to challenge stude	ents to synthesize the knowledge acquired through their matic and iterative design and analysis process, apply it		
	Robotics undergraduate courses at U-M and, using a system to solving a roal, onen anded Robotics problem			ematic and iterative (design and analysis	process, apply it
			s problem.			
	Full Term Credit Hours		Half Ierm Credit Hours			
	Undergraduate Mi	in: 4 Graduat	e Max:	Undergraduate Mi	n: Graduat Graduat	e Max:
Course Credit Type						
	Undergraduate Student					
	Repeatability					
	Course is Repeatable for Credit		Course is Y graded			
	Maximum number of repeatable credits:		\Box Can be taken more than once in the same term			

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Ann Arbor, MI 48109-1382

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Phone: 734.763.2113

Fax: 734.936.3148

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			47
Sub	ject: Catalog:		
Ŋ	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 C □ Instructor Cor ☑ No Consent	Drop Consent Consent
_	CURRENT LISTING		REQUESTED LISTING
	Advisory Prerequisite (254 char)		Advisory Prerequisite (254 char)
Ø	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char) Junior standing; TCHNCLCM 350; at least one of ROB 310, 311, 320, 330, or 340
	Minimum grade requirement:		Minimum grade requirement: C
	Credit Exclusions		Credit Exclusions

	Credit Exclusions		Credit Exclusions
V	Course Components Lecture Seminar Recitation Lab Discussion Independent Study 	Graded Componen	nt Terms Typically Offered Fall Winter Spring Summer Spring/Summer
Cognizant Faculty Member Name: Kira Barton		(ira 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: OdwACfr	Print: Odest Chadwicke Jenkins	Date: 8/21/2023
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair:	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	<u>Class Length</u> Full term
Contact hours (lecture):	<u>Contact hours (lecture):</u> 3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	<u>Contact hours (lab)</u> 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 mo	dule		
PT = project task			



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested		
	New Course	Date of Submission: 2023-08-11	
	Modification of Existing		
Course			
	Deletion of Existing Course		
	Course Offerred	RO USE ONLY	
	Course Offered	Date Received:	
	Indefinitely One term only	Date Completed:	
		Completed By:	

CURRENT LISTING

CURRENT LISTING			REQUESTED LISTING			
Dept (Home): Chemistry Subject: CHEM Catalog: 511			Dept (Home): Chemistry Subject: CHEM Catalog: 511			
🗆 Course is Ci	ross-Listed with Oth	er Departments	🗆 Course is C	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)			Abbreviated Title (20 char)			
Materials Chem			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.					cture and	
Full Term Credit H	ours		Half Term Credit Hours			
Undergraduate Mi	in: 3 Graduat	e Min: 3	Undergraduate Min: Graduate Min:		e Min:	
Undergraduate Ma	ax: 3 Graduat	e Max: 3	Undergraduate Max: Graduate Max:		e Max:	
Course Credit Type	e					
Undergraduate	Student, Rackham G	Graduate Student				
Repeatability			_			
Course is Repeatable for Credit		Course is Y graded				
Maximum number of repeatable credits:			\Box Can be taken more than once in the same term			

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				54		
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 Instructor Co No Consent 	Consent onsent	Drop Consent Department Consent Instructor Consent No Consent		
	CURRENT LISTING		REQUESTED	LISTING		
	Advisory Prerequisite (254 char) CHEM 461, BIOLCHEM 415, CH permission of course director	EM 430; and	Advisory Prei CHEM 3	requisite (254 char) 02 and CHEM 461		
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)			
	Minimum grade requirement:		Minimum gra	ade requirement:		

				•
	Credit Exclusions		Credit Exclusions	
	Course Components Curse Components Curse Components Seminar Recitation Lab Discussion Independent Study	Graded Componer	nt	Terms Typically Offered Fall Winter Spring Summer Spring/Summer
Cognizant Faculty Member Name: Patti Vogel		el	Cognizant Faculty N	Vember 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:	Limity C. Meky	Print: Timothy McKay	Date: 8/21/2023
Cross-Listed Department Chair:	4.batte	Print: Elizabeth A. Holm	Date: 8/14/2023
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

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



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested □ New Course ☑ Modification of Existing Course □ Deletion of Existing Course	Date of Submission: 2023-05-25 Effective Term: Fall 2024
V	Course Offered Indefinitely One term only	RO USE ONLY Date Received: Date Completed: Completed By:

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
Ŋ	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			Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	itle)	<u>.</u>	Course Title (full title)		
		ture Series in Syster	n Science	Iutorial Lecture Series in System Science		
	Abbreviated Title (20 char)			Abbreviated litle (20 char)		
	Tutorial Sys					
	Course Description	n (Please limit to 50	words and attach se	eparate sneet if nece	essary)) are deveted
	Students are		trol and Signal Brog	ossing The tutorials	ctions 01, 02 and 03	are devoted,
	respectively, to co	h fields invited from	n academia and indu	essing. The futurials	ions are self-contair	add and accessible
	to all graduate stu	dents in System Sci	n acaueinia anu inu ence	ustry. The presentati		
	Full Term Credit H	lours		Half Term Credit H	ours	
	Undergraduate	Min: Graduat	e Min: 1	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate M	ax: Graduat	e Max: 1	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type	e		U U		
	Rackham Graduate Student					
	Repeatability					
	Course is Rep	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits:			\Box Can be taken more than once in the same term		



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Subject: Elec Engin & Computer Sci	Catalog: 500		57
Grading Basis Graded (A – E) Grading Credit/No Credit Satisfactory/Unsatisfactor Business Administration Grading Not for Credit Not for Degree Credit Degree Credit Only	ory Add Consent Department Co Instructor Cons No Consent	Drop Consent onsent	Consent nsent
CURRENT LISTING		REQUESTED LISTING	
Advisory Prerequisite (254 ch Graduate standing	ar)	Advisory Prerequisite (254 char) Graduate standing	
Enforced Prerequisite (254 ch	ar)	Enforced Prerequisite (254 char)	
Minimum grade requirement	:	Minimum grade requirement:	
Credit Exclusions		Credit Exclusions	
Course Components Curse Components Curse Components Curse Components Curse Components Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curse Curs	Graded Component	Terms Typically Of ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer	fered
Cognizant Faculty Member Name:	Raj Nadakuditi	Cognizant Faculty Member Title:	
SIGNATURES ARE REQUIRED FROM	I ALL DEPARTMENTS INVOLVE Email: vyas@umich.edu	D (Please Print AND Sign Name) Phone: 734-647-175	4
CoE Curriculum Committee Representative:	At markeropenty	Print: Achilleas Anastasopoulos	Date: 7/14/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:	Heath Hofman	Print:Heath Hofmann	Date: 7/14/23
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

Cross-Listed Department Chair:

DEPARTMENTAL/COLLEGE USE ONLY

Print:

Date:

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



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested □ New Course ☑ Modification of Existing Course □ Deletion of Existing Course	Date of Submission: 2023-05-25 Effective Term: Fall 2024
V	Course Offered Indefinitely One term only	RO USE ONLY Date Received: Date Completed: Completed By:

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
Ŋ	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 501			Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 501		
	🗆 Course is Cr	ross-Listed with Oth	er Departments	□ Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full title) Probability and Bandom Processes			Course Title (full title) Probability and Bandom Processes		
	Abbreviated Title (20 char)		Abbreviated Title (20 char)			
	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					a algebras, es, stationary nd convergence of
	Full Term Credit HoursUndergraduate Min: 4Graduate Min: 4Undergraduate Max: 4Graduate Max: 4		Half Term Credit HoursUndergraduate Min:Graduate Min:Undergraduate Max:Graduate Max:		e Min: e Max:	
	Course Credit Type Undergraduate Student, Rackham Graduate Student, Nor			on-Rackham Gradua	ite Student	
	Repeatability					
	🗆 Course is Rep	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits:			\Box Can be taken more than once in the same term		

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Sub	ject: 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

	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 C Standing Minimum grade requirement: C	Graduate	Enforced Prerequisite (254 char) EECS 301; (C or better, No OP/F) or Graduat Standing Minimum grade requirement: C	:e
	Credit Exclusions		Credit Exclusions	
	Course ComponentsGrImage: LectureImage: LectureImage: SeminarImage: LectureImage: RecitationImage: LectureImage: LabImage: LectureImage: LectureImage	aded Componer 2 3 3 3 3 3 3	ent 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

CoE Curriculum

Email: vyas@umich.edu

Phone: 734-647-1754

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Amatheopen

Committee Representative:	Print: Achilleas Anastasopoulos	Date: 7/14/23	
CoE Curriculum Committee Chair:	Print:	Date:	
Home Department Chair: Heath Hyman	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:
<u>Course Description</u>	Course Description
Introduction to probability and random processes. Topics	Introduction to probability and random processes. Topics
include probability axioms, sigma algebras, random	include probability axioms, sigma algebras, random
vectors, expectation, probability distributions and	vectors, expectation, probability distributions and
densities, Poisson and Wiener processes, stationary	densities, Poisson and Wiener processes, stationary
processes, autocorrelation. spectral density, effects of	processes, autocorrelation. spectral density, effects of
filtering, linear least-squares estimation, and convergence	filtering, linear least-squares estimation, and convergence
of random sequences.	of random sequences.
<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	Contact hours (lecture):
3	3
<u>Contact hours (recitation)</u>	<u>Contact hours (recitation)</u>
<u>1</u>	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.



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

	CURRENT LISTING			REQUESTED LISTING		
Ŋ	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 502		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 502			
	🗆 Course is Cr	ross-Listed with Oth	er Departments	Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full title)		Course Title (full title)			
	Stochastic P	rocesses		Stochastic Processes		
	Abbreviated Title (20 char)		Abbreviated Title (20 char)			
	Stoch Processes		Stoch Processes			
	Course Description	Course Description (Please limit to 50 words and attach separate sheet if necessary)				
	Correlations	and spectra. Quad	lratic mean calculus,	, including stochastic integrals and representations,		
	wide-sense station	nary processes (filte	ring, white noise, sa	mpling, time averag	es, moving average	S,
	auto-regression).	Renewal and regen	erative processes. N	larkov chains, rando	om walk and run, bi	ranching processes.
	Markov jump proc	cesses, uniformizatio	on, reversibility, and	queueing applicatio	ns.	
_	Full Term Credit Hours		Half Term Credit Hours			
	Undergraduate Mi	in: 3 Graduat	e Min: 3	Undergraduate Mi	n: Graduat	te Min:
	Undergraduate Ma	ax: 3 Graduat	e Max: 3	Undergraduate Ma	ax: Graduat	te Max:
	Course Credit Type					
	Undergraduate	Student, Rackham (Graduate Student			
	Repeatability			_		
	□ Course is Rep	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits:		Can be taken more than once in the same term			

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				63
Subj	ect: 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 Instructor Co No Consent	Drop Cons Consent 🗌 Depa nsent 🔲 Instru 🖉 No Co	ent rtment Consent ictor Consent onsent
	CURRENT LISTING		REQUESTED LISTING	
	Advisory Prerequisite (254 char) EECS 501		Advisory Prerequisite (254 cha ECE 501	ır)
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 cha	ar)
	Minimum grade requirement:		Minimum grade requirement:	
	Credit Exclusions		Credit Exclusions	
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componen Graded Componen Graded Component Graded Component	nt Terms Typ ☑ Fall ☑ Winter □ Spring □ Summe □ Spring/	ically Offered r Summer
Cog	nizant Faculty Member Name: Vijay	Subramanian	Cognizant Faculty Member Tit	le:
SIGI Con	NATURES ARE REQUIRED FROM AL tact Person: Nancy Slowey	L DEPARTMENTS INVOLV	/ED (Please Print AND Sign Nam h.edu Phone:763-2	n e) 2305
CoE Curriculum Committee Representative:			Print:Anastasopoulos, A	Date: 6/8/23

CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: Heath Hyman	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	Course Description
Correlations and spectra. Quadratic mean calculus,	Correlations and spectra. Quadratic mean calculus,
including stochastic integrals and representations,	including stochastic integrals and representations,
wide-sense stationary processes (filtering, white noise,	wide-sense stationary processes (filtering, white noise,
sampling, time averages, moving averages,	sampling, time averages, moving averages,
auto-regression). Renewal and regenerative processes.	auto-regression). Renewal and regenerative processes.
Markov chains, random walk and run, branching	Markov chains, random walk and run, branching
processes. Markov jump processes, uniformization,	processes. Markov jump processes, uniformization,
reversibility, and queueing applications.	reversibility, and queueing applications.
<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	3
Contact hours (recitation)	Contact hours (recitation)

Contact hours (lab)

Additional Info:

Contact hours (lab)

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.



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
V	Course Offered Indefinitely One term only	RO USE ONLY Date Received: Date Completed: Completed By:

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
N	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 503		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 503			
	🗆 Course is Cr	ross-Listed with Oth	er Departments	🗆 Course is C	ross-Listed with O	ther Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	tle)		Course Title (full title)		
	Introduction	to Numerical Elect	romagnetics	Introduction to Numerical Electromagnetics		
	Abbreviated Title ((20 char)		Abbreviated Title (20 char)		
	Intro Num Em			Intro Num Em		
	Course Description (Please limit to 50 words and attach s			eparate sheet if nece	essary)	
	Introduction	to numerical meth	ods in electromagne	etics including finite	difference, finite e	element and integral
	equation methods	for static, harmoni	c and time depende	nt fields; use of com	mercial software	for analysis and
	design purposes; a	applications to open	and shielded transi	mission lines, antenr	has, cavity resonar	ices and scattering.
	Full Term Credit Ho	ours		Half Term Credit Hours		
	Undergraduate Mi	in: Graduat	e Min: 3	Undergraduate Mi	n: Gradua	ate Min:
	Undergraduate Max: Graduate Max: 3		Undergraduate Max: Graduate Max:		ate Max:	
	Course Credit Type					
	Rackham Gradu	ate Student				
	Repeatability					
	🗆 Course is Rep	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits:		\Box Can be taken more than once in the same term			

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			66	
Sub	iect: 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 C Instructor Cor No Consent	Drop Consent Consent	
	CURRENT LISTING		REQUESTED LISTING	
	Advisory Prerequisite (254 char) EECS 330		Advisory Prerequisite (254 char) EECS 330	
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)	
	Credit Exclusions		Credit Exclusions	
	Course Components Course Course Components Course	Graded Componen	nt Terms Typically Offered □ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer	
Cog	nizant Faculty Member Name: Leur	ng Tsang	Cognizant Faculty Member Title:	
SIGI	NATURES ARE REQUIRED FROM AL	L DEPARTMENTS INVOLV	ED (Please Print AND Sign Name)	
Con	tact Person: Punam Vyas	Email: vyas@umich.ed	u Phone: 734-647-1754	
CoE	Curriculum	arteropenty	Print: Achilleas Anastasonoulos Date: 6/8/23	

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

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



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested New Course Modification of Existing Course Deletion of Existing Course 	Date of Submission: 2023-05-25 Effective Term: Fall 2024
\mathbf{k}	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:

CURRENT LISTING

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 C	ross-Listed with Oth	er Departments	🗆 Course is C	ross-Listed with Ot	her Departments
Department	Subject	Catalog Number	Department	Subject	Catalog Number
Course Title (full ti	itle)		Course Title (full ti	tle)	
Computational Data Science and Machine		Computational Data Science and Machine			
Learning			Learning		
Abbreviated Title (20 char)		Abbreviated Title (20 char)			
Comp. DS & ML			Comp. DS &	ML	
Course Description	n (Please limit to 50	words and attach se	eparate sheet if nece	essary)	
Introductior	n to computational i	nethods for identify	ying patterns and outliers in large data sets. Topics include		
the singular and e	igenvalue decompo	sition, independent	component analysis	, graph analysis, cl	ustering, linear,
regularized, sparse	e and non-linear mo	del fitting, deep, co	nvolutional and recu	irrent neural netwo	orks. Students
program methods	; lectures and labs e	emphasize computat	ional thinking and re	easoning.	
Full lerm Credit H	ours		Half Ierm Credit H	ours	
Undergraduate M	in: 4 Graduat	e Min: 4	Undergraduate Mi	n: Graduat	te Min:
Undergraduate Ma	ax: 4 Graduat	e Max: 4	Undergraduate Ma	ax: Graduat	te Max:
Course Credit Type					
Repeatability					
	eatable for Credit			hal	
Maximum number	r of repeatable cred	its:	\Box Can be taken more than once in the same term		

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Sub	ject: 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

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CURRENT LISTING

CURRENT LISTING		REQUESTED LISTING			
	Advisory Prerequisite (254 char)		Advisory Prerequisite (254 char)		
	Enforced Durant with (254 chev)				
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)		
	[EECS 301 or MATH 425 or STATS 250 o	or 412 or 426	[EECS 301 or MATH 425 or STATS 250 or 412 or 426		
	or IOE 265; (C or better, No OP/F)] or Gradu	ate Standing	or IOE 265; (C or better, No OP/F)] or Graduate Standing		
	Minimum grade requirement: C		Minimum grade requirement: C		
	Credit Exclusions		Credit Exclusions		
	Students cannot earn credit for both EECS 505 and		Students cannot earn credit for both ECE 505 and		
	EECS 551.		ECE 551.		
	Course Components Gra	aded Componer	it Tarres Turiselly Offered		
	🗹 Lecture	1			
	□ Seminar □	1	I Fall		
	Recitation]	M Winter		
		1	Spring		
]	🗆 Summer		
]	Spring/Summer		
	□ Independent Study □				
Cognizant Faculty Member Name: Raj Nadakuditi		i	Cognizant Faculty Member Title:		
SIGN	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:	A markesquety	Print: Achilleas Anastasopoulos	Date: 6/8/23	
CoE Curriculum Committee Chair:		Print:	Date:	
Home Department Chair:	Heath Hofman	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:	

Current:

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

Contact hours (lecture): 3

Contact hours (recitation)

Contact hours (lab)

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.

Class Length Full term

<u>Contact hours (lecture):</u> 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:

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.



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
K	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
N	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 506		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 506			
	🗆 Course is Cr	ross-Listed with Oth	er Departments	🗆 Course is C	ross-Listed with	Other Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full title)		Course Title (full title)			
	Design of Po	ower Electronics		Design of Power Electronics		
	Abbreviated Title (20 char)		Abbreviated Title (20 char)			
	Dsgn Pwr Electronics		Dsgn Pwr Electronics			
	Course Description	n (Please limit to 50	words and attach se	eparate sheet if nece	essary)	
	The course p	presents both the th	eoretical and practi	cal design, analysis,	construction, a	nd measurement of
	circuits and compo	onents in different t	ypes of power conve	erters. The course v	vill teach conce	pts and present case
	studies through le	ctures, homework,	design problems, an	d a final project.		
	Full Term Credit Ho	ours		Half Term Credit Hours		
	Undergraduate Mi	in: 3 Graduat	e Min: 3	Undergraduate Mi	n: Grad	duate Min:
	Undergraduate Ma	ax: 3 Graduat	e Max: 3	Undergraduate Max: Graduate Max:		duate Max:
	Course Credit Type	9				
	Undergraduate Student, Rackham Graduate Student, I			on-Rackham Gradua	te Student	
	Repeatability					
	🗆 Course is Rep	eatable for Credit		Course is Y graded		
	Maximum number	r of repeatable cred	its:	\Box Can be taken more than once in the same term		

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Sub	ject: 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 □ Instructor Co ☑ No Consent	Consent Insent	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 Course Components Curre Seminar Recitation Lab Discussion Independent Study	Graded Componer	nt	Terms Typically Offered
Cognizant Faculty Member Name: Al-Thaddeus Avestruz Cognizant Faculty Member Title:				Member Title:

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

Contact P	Person:	Punam	Vyas
-----------	---------	-------	------

Email:vyas@umich.edu

Phone:734-647-1754

CoE Curriculum Committee Representativ	Print: Achilleas Anastasopoulos	Date: 7/14/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: Heath Nofman	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:
<u>Course Description</u>	<u>Course Description</u>
The course presents both the theoretical and practical	The course presents both the theoretical and practical
design, analysis, construction, and measurement of	design, analysis, construction, and measurement of
circuits and components in different types of power	circuits and components in different types of power
converters. The course will teach concepts and present	converters. The course will teach concepts and present
case studies through lectures, homework, design	case studies through lectures, homework, design
problems, and a final project.	problems, and a final project.
<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on 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

CURRENT LISTING			REQUESTED LISTING			
Ŋ	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 508		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 508		r Engineering	
	🗌 Course is Cr	ross-Listed with Oth	er Departments	🗆 Course is C	ross-Listed with (Other Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	tle)		Course Title (full ti	tle)	
	Control and	Modeling of Power	Electronics	Control and Modeling of Power Electronics		
	Abbreviated Title ((20 char)		Abbreviated Title (20 char)		
	CoMPEL		CoMPEL			
	Course Description (Please limit to 50 words and attach s The course presents both the theoretical and pract include small-signal models; digital and analog control; sy considerations; distributed power; and tools for compute			eparate sheet if nece cal modeling and co vitched, sampled-dat r modeling and simu	essary) ntrol of power cc ta, and averaged lation.	nverters Topics models; large signal
	Full Term Credit Ho	ours		Half Term Credit H	ours	
	Undergraduate Mi	in: 3 Graduat	e Min: 3	Undergraduate Mi	n: Gradu	iate Min:
	Undergraduate Ma	ax: 3 Graduat	e Max: 3	Undergraduate Ma	ix: Gradu	iate Max:
	Course Credit Type					
	Undergraduate S	Student, Rackham G	Graduate Student, N	on-Rackham Gradua	te Student	
	Repeatability					
	🗆 Course is Rep	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits:			\square Can be taken more than once in the same term		



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Sub	ject: Elec Engin & Computer Sci	Catalog: 508		
	Crading Dasis			
	🗹 Graded (A – E)			
	Credit/No Credit			
	□ Satisfactory/Unsatisfactory	Add Consent		Drop Consent
	🗆 Pass/Fail	Department	Consent	Department Consent
	Business Administration	Instructor Co	nsent	Instructor Consent
	Grading	No Consent		🗆 No Consent
	Not for Credit			
	Not for Degree Credit			
	Degree Credit Only			
				STINC
			REQUESTED LI	STING
	Advisory Prerequisite (254 char)		Advisory Prere	quisite (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 Componer	nt Terms Typically Offered ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer		
Cog	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:	metricipanty	Print: Achilleas Anastasopoulos	Date: 7/27/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair: Heath Hfm.	an	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 Course Description** The course presents both the theoretical and practical The course presents both the theoretical and practical modeling and control of power converters Topics include modeling and control of power converters Topics include small-signal models; digital and analog control; switched, small-signal models; digital and analog control; switched, sampled-data, and averaged models; large signal sampled-data, and averaged models; large signal considerations; distributed power; and tools for computer considerations; distributed power; and tools for computer modeling and simulation. modeling and simulation. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 3 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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested			
New Course		Data of Submission, 2022 0C 22		
Modification of Existing	Effective Term: Fall 2024			
Course				
	Deletion of Existing Course			
0 00 1		RO USE ONLY		
Ø	□ One term only	Date Received:		
		Date Completed:		
		Completed By:		

CURRENT LISTING

	CURRENT LISTING		REQUESTED LISTING			
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 509		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 509			
	Course is Cr	oss-Listed with Oth	er Departments	Course is Ci	ross-Listed with Oth	ner Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti BIOMEMS	itle)		Course Title (full title) BIOMEMS		
	Abbreviated Title	(20 char)		Abbreviated Title (20 char)		
	BIOMEMS		BIOMEMS			
	Course Description (Please limit to 50 words and attach se Covers the latest advances in bioMEMS, with specific biology and cell culture. We will use an organism's develor framework for teaching bioMEMS devices: from microPC is to provide students familiar with microfabrication and evaluate bioMEMS devices and innovations. We will cover part of the course.			eparate sheet if nece ic attention to Micro opmentfrom geno R chips to microfluic Microsystems with a r implantable and d	essary) osystems targeting o me to multicellular lic mixers to tissue s context from which iagnostic microsyste	development tissue as a scaffolds. The aim n to view and ems in the later
_	Full Term Credit H	ours		Half Term Credit H	ours	
	Undergraduate M Undergraduate M	in: 3 Gradua ax: 3 Gradua	te Min: 3 te Max: 3	Undergraduate Mi Undergraduate Mi	n: Graduat ax: Graduat	te Min: te Max:
Ø	Course Credit Type Undergraduate Student, Rackham Graduate Student					
	Repeatability					
	Course is Repeared	eatable for Credit		Course is Y grad	ed	
	Maximum number	r of repeatable crec	lits:	\square Can be taken more than once in the same term		



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Subj	ect: Elec Engin & Computer Sci Cata	alog: 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 C □ Instructor Con ☑ No Consent	Drop Consent Consent	t Consent Consent
CURRENT LISTING REQUESTED LISTING				
	Advisory Prerequisite (254 char)		Advisory Prerequisite (254 char)	
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)	
	Minimum grade requirement:		Minimum grade requirement:	
	Credit Exclusions		Credit Exclusions	
	Course Components Lecture Seminar Recitation Lab	Graded Componer	nt Terms Typically ☑ Fall □ Winter □ Spring □ Summer	Offered
	 Discussion Independent Study 		Spring/Summ	ier

Cognizant Faculty Member Title:

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

Contact Person: Nancy Slowey

Cognizant Faculty Member Name: Euisik Yoon

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: Heath Hyman	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 ONL	Y
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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.

Class Length Full term

Contact hours (lecture): 3

Contact hours (recitation)

Contact hours (lab)

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

<u>Contact hours (lecture):</u> 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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested □ New Course ☑ Modification of Existing Course □ Deletion of Existing Course	Date of Submission: 2023-05-25 Effective Term: Fall 2024
V	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 511		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 511			
	Course is Cr	oss-Listed with Othe	er Departments	Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	itle)		Course Title (full ti	tle)	
	Integrated A	nalog/Digital Interf	ace Circuits	Integrated Analog/Digital Interface Circuits		
	Abbreviated Title (20 char)			Abbreviated Title (20 char)		
	A/D Interface	S		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, multi-step and pipeline Nyquist rate, architectures. Oversampling converters are also discussed. Practwork is a significant part of this course. Students design and model complete converters. Projects ar overseen/graded by faculty and may also involve mentoring by representatives from external organical provides the second statement of the second state			h, folding, ractical design are anizations.		
	Full Term Credit H	ours		Half Term Credit H	ours	
	Undergraduate Mi	in: 4 Graduat	e Min: 4	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate Ma	ax: 4 Graduat	e Max: 4	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type Undergraduate Student, Rackham Graduate Student, N		Ion-Rackham Graduate Student			
	Repeatability					
	Course is Repeatable for Credit			Course is Y graded		
	Maximum number of repeatable credits:			□ Can be taken more than once in the same term		

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Sub	oject: Elec Engin & Computer Sci Cat	alog: 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 Graded Component Image: Course Components Image: Course Component Image: Course Component Course Image: Course Component Image: Course Course Course Image: Course Course Image: Course Course Course Image: Course Course Image: Course Course Course Image: Course Course Image: Course Course Image: Course Image: Course Image: Course		nt Terms Typically Offered	
Cognizant Faculty Member Name: Michael Flynn Cognizant Faculty Member Title:				
SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name)				

Email: nslowey@umich.edu

Phone: 734-763-2305

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CoE Curriculum Committee Representative:	Print: Achilleas Anastasopoulos	Date: 8/3/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: Heath Hyman	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:

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.

Class Length Full term

Contact hours (lecture):

3

Contact hours (recitation)

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.

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.

<u>Class Length</u> Full term <u>Contact hours (lecture):</u> 3 <u>Contact hours (recitation)</u>

Contact hours (lab)

1



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on 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

	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 C	ross-Listed with Oth	er Departments	Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full t	itle)		Course Title (full title)		
	Amorphous	and Microcrystallin	e Semiconductor	Amorphous	and Microcrystallin	e Semiconductor
	Thin Film Devices			Thin Film Devices		
	Abbreviated Title (20 char)		Abbreviated Title (Abbreviated Title (20 char)		
	Amorph Sem		Amorph Sen	1		
	Course Description (Please limit to 50 words and attach se			eparate sheet if nece	essary)	
	Introduction	n and fundamentals	of physical, optical a	and electrical proper	rties of amorphous	and
	microcrystalline semiconductor based devices: MIM struc			tures, Schottky diod	es, p-i-n junctions,	heterojunctions,
	MIS structures, thin-film transistors, solar cells, threshold			and memory switch	ing devices and larg	ge area x-ray
	radiation detector	ſS.				
_	Full Term Credit F	lours		Half Term Credit H	ours	
	Undergraduate	Min: Graduat	te Min: 3	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate M	ax: Graduat	te Max: 3	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type					
	Rackham Graduate Student					
	Repeatability					
	Course is Repeatable for Credit		Course is Y graded			
	Maximum number of repeatable credits:			\Box Can be taken more than once in the same term		

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				84	
Subj	ect: Elec Engin & Computer Sci	Catalog: 512		04	
	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 C □ Instructor Cor ☑ No Consent	Drop Consent Consent	ent Consent Consent nt	
	CURRENT LISTING		REQUESTED LISTING		
	Advisory Prerequisite (254 char) EECS 421		Advisory Prerequisite (254 char) EECS 421		
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)		
	Minimum grade requirement:		Minimum grade requirement:		
	Credit Exclusions		Credit Exclusions		
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componer	It Terms Typically ☑ Fall ☑ Winter ☐ Spring ☐ Summer ☐ Spring/Sum	r Offered mer	
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: Heath Hofman	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

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.

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.

<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on 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

	CURRENT LISTING			REQUESTED LISTING		
Ŋ	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 514			Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 514		
	🗆 Course is Cr	ross-Listed with Oth	er Departments	🗆 Course is C	ross-Listed with Otl	ner Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full title)			Course Title (full title)		
	Advanced N	1EMS Devices and Temperature 1	echnologies	Advanced MEMS Devices and Technologies		
	Abbreviated Title (20 char)			Abbreviated Title (20 char)		
	Advanced N	1EMS		Advanced MEMS		
_	Course Description	n (Please limit to 50	words and attach se	eparate sheet if necessary)		
	Advanced m	nicro electro mecha	nical systems (MEMS	b) devices and technologies. Transduction techniques,		
	including piezoele	ctric, electromagne	tic, electrothermal, a	and resonant technic	ques. Chemical, gas	s, and biological
	sensors, microfluid	dic and biomedical o	devices. Micromach	ining technologies such as laser machining and		
	microdrilling, EDIV	i, materials such as	SIC and diamond. So	ensor and actuator a	analysis and design	through CAD.
	Full Term Credit H	ours		Half lerm Credit H	ours	
	Undergraduate Mi	in: Graduat	e Min: 4	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate Ma	ax: Graduat	e Max: 4	Undergraduate Ma	ax: Graduat	
	Course Credit Type					
	Rackham Gradu	ate Student				
	Repeatability					
	Course is Rep	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits:			\Box Can be taken more than once in the same term		

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Subject: Elec Engin & Computer Sci	Catalog: 514	87			
Grading Basis Graded (A – E) Graded (A – E) Grading Basis Business Administration Grading Not for Credit Degree Credit Degree Credit Only	Add Consent Department Instructor Co No Consent 	Drop Consent Consent			
CURRENT LISTING		REQUESTED LISTING			
Advisory Prerequisite (254 char) EECS 414		Advisory Prerequisite (254 char) EECS 414			
Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)			
Minimum grade requirement:		Minimum grade requirement:			
Credit Exclusions		Credit Exclusions			
Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componen	nt 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:

Committee Representative:	Print: Achilleas Anastasopoulos	Date:6/13/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: Heath Hofman	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:

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

Contact hours (lecture):

Contact hours (recitation)

Contact hours (lab)

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.

Requested:

Class Length Full term

<u>Contact hours (lecture):</u>
4

Contact hours (recitation)

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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on 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

	CURRENT LISTING			REQUESTED LISTING		
N	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 515			Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 515		
	\Box Course is Cross-Listed with Other Departments			🗆 Course is C	ross-Listed with O	ther Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	(full title)		Course Title (full title)		
	Integrated N	Aicrosystems		Integrated Microsystems		
	Abbreviated Title (20 char)			Abbreviated Title (20 char)		
	Integ. Micro	osystems		Integ. Microsystems		
	Course Description	n (Please limit to 50	words and attach se	eparate sheet if necessary)		
	Review of in	terface electronics	for sense and drive	and their influence on device performance, interface		
	standards, MEMS	and circuit noise so	urces, packaging and	d assembly techniqu	es, testing and cal	ibration
	approaches, and c	communication in in	tegrated microsyste	ms. Applications, in	cluding RF MEMS,	optical MEMS,
	bioMEMS, and mi	crofluidics. Design	project using CAD ar	id report preparation	n.	
	Full lerm Credit H	ours		Half Ierm Credit H	ours	
	Undergraduate Mi	in: Graduat	e Min: 4	Undergraduate Mi	n: Gradua	ate Min:
	Undergraduate Ma	ax: Graduat	e Max: 4	Undergraduate Max: Graduate Max:		
	Course Credit Type					
	Rackham Gradu	ate Student				
	Repeatability					
	Course is Rep	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits:			\Box Can be taken more than once in the same term		

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				90	
Subj	ject: 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 C Instructor Con No Consent	Drop Consent onsent	Consent nsent	
	CURRENT LISTING		REQUESTED LISTING		
	Advisory Prerequisite (254 char) EECS 414		Advisory Prerequisite (254 char) EECS 414		
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)		
	Minimum grade requirement:		Minimum grade requirement:		
	Credit Exclusions Four Credits Only, None.		Credit Exclusions		
	Course Components Course Components Course Components Seminar Recitation Lab Discussion Independent Study	Graded Componen	t Terms Typically Off ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer	fered r	
Cog	nizant Faculty Member Name: Yogesł	h Gianchandani	Cognizant Faculty Member Title:		
SIGN Con	NATURES ARE REQUIRED FROM ALL I	DEPARTMENTS INVOLVI	ED (Please Print AND Sign Name)		
CoE Com	Curriculum nmittee Representative:	hoperty	Print: Achilleas Anastasopoulos	Date: 7/14/23	
CoE	Curriculum Committee Chair:		Print:	Date:	
Home Department Chair: Heath Hyman			Print:Heath Hofmann	Date: 7/14/23	
Cross-Listed Department Chair:			Print:	Date:	
Cros	ss-Listed Department Chair:		Print: Date		
Cros	ss-Listed Department Chair:		Print:	Date:	

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

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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on 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

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			🗹 Course is C	ross-Listed with Ot	her Departments
Department	Subject	Catalog Number	Department	Subject	Catalog Number
Elec Engin & Computer Sci - EECS - 516		Elec & Comp Eng - ECE - 516			
Course Title (full ti	tle)		Course Title (full title)		
Medical Ima	iging Systems		Medical Imaging Systems		
Abbreviated Title	(20 char)		Abbreviated Title (20 char)		
Med Imag S	ys		Med Imag Sys		
Course Description (Please limit to 50 words and attach s Principles of modern medical imaging systems. For systems model of the imager. Fundamental similarities b be stressed. Modalities covered include radiography, x-ra-			eparate sheet if nece each modality the b tween the imaging e computed tomogra	essary) asic physics is desc equations of differe ophy (CT), NMR ima	ribed leading to a ent modalities will ging (MRI), and
Full Term Credit H	ours		Half Term Credit Hours		
Undergraduate Mi	in: Graduat	e Min: 3	Undergraduate Mi	n: Gradua	te Min:
Undergraduate Ma	ax: Graduat	e Max: 3	Undergraduate Max: Graduate Max:		te Max:
Course Credit Type	e				
Rackham Graduat	e Student				
Repeatability					
🗌 Course is Rep	eatable for Credit		Course is Y graded		
Maximum number of repeatable credits:			□ Can be taken more than once in the same term		

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Subj	ect: Biomedical Engineering Ca	talog: 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 C Instructor Con No Consent	Drop Consent onsent	isent int
	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 Image: Course Components Image: Course Component Image: Course Component Course Image: Course Component Image: Course Course Course Image: Course Course Image: Course Course Image: Course Course Image: Course Course Course Image: Course Course Image: Course Course Image: Course Image: Course Image: Course Image: Course Image: Course Image: Course Image: Course Image: Course Image: Course		ent Terms Typically Offered ☑ Fall □ Winter □ Spring □ Summer □ Spring/Summer		
Cog	nizant Faculty Member Name: Doug	g Noll	Cognizant Faculty Member Title:	
SIG Con	tact Person: Punam Vyas	Email: vyas@umich.edu	ED (Please Print AND Sign Name)	
CoE Con	Curriculum mittee Representative:		Print: Achilleas Anastasopoulos	Date: 7/20/23
CoE Curriculum Committee Chair:			Print:	Date:
Home Department Chair: fm Bruy			Print: TIMBRONS	Date: 6/20/23
Ċro	ss-Listed Department Chair: \mathcal{H}	eath Hyman	Print: Heath Hofmann	Date: 7/20/23
Cross-Listed Department Chair: Print: Dat				Date:
Cro	ss-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

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

Contact hours (lecture):

3

Contact hours (recitation)

Contact hours (lab)

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.

Class Length Full term

Contact hours (lecture): 3

Contact hours (recitation)

Contact hours (lab)

Additional Info:

<u>Submitted by:</u> Cross-listed dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Actio	on Requested New Course Modification of Existing Course Deletion of Existing Course 	Date of Submission: 2023-05-12 Effective Term: Fall 2024
K	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
	Dept (Home): Space Science & Engineering Subject: SPACE Catalog: 595			Dept (Home): Space Science & Engineering Subject: SPACE Catalog: 595		
	Course is Cr	ross-Listed with Oth	er Departments	🗹 Course is C	ross-Listed with O	ther Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
N	Elec Eng & Comp Sci - EECS - 518		Elec & Comp Eng - ECE - 518			
	Course title (full title) Magnetosphere and Solar Wind		d	Course Title (full title) Magnetosphere and Solar Wind		
	Abbreviated Title (20 char)			Abbreviated Title (20 char)		
	Magnetosph	nere		Magnetosphere		
	Course Description (Please limit to 50 words and attach s General principles of magnetohydrodynamics; theo wind, interaction of solar wind with the magneto-sphere magnetotail, trapped particles, auroras.			eparate sheet if nece ry of the expanding of the Earth and oth	essary) atmospheres; pro er planets; bow sł	perties of solar nock and
	Full Term Credit Ho	ours		Half Term Credit Hours		
	Undergraduate Mi	in: 3 Graduat	e Min: 3	Undergraduate Mi	n: Gradua	ate Min:
	Undergraduate Ma	ax: 3 Graduat	e Max: 3	Undergraduate Max: Graduate Max:		ate Max:
	Course Credit Type Undergraduate Student, Rackham Graduate Student					
	Repeatability					
	Course is Repeatable for Credit			□ Course is Y graded		
	Maximum number of repeatable credits:			□ Can be taken more than once in the same term		

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Subject: Space Science & Engineering Catalog: 595 Grading Basis Image: Graded (A – E) Credit/No Credit Image: Grading Catalog: 595 Satisfactory/Unsatisfactory Add Consent Pass/Fail Image: Department Consent Business Administration Instructor Consent Grading Image: No Consent Not for Credit Image: Catalog: 595	Drop Consent Department Consent Instructor Consent
Grading Basis ✓ Graded (A – E) Credit/No Credit Satisfactory/Unsatisfactory Pass/Fail Business Administration Grading Not for Credit Gradit	Drop Consent Department Consent Instructor Consent
 Not for Degree Credit Degree Credit Only 	Mo consent
CURRENT LISTING REQUEST	TED LISTING
Advisory Prerequisite (254 char) Advisory Graduate standing Grad	Prerequisite (254 char) duate Standing
Enforced Prerequisite (254 char) Enforced	Prerequisite (254 char)
Minimum grade requirement:	n grade requirement:
Credit Exclusions Credit Exclusions	clusions
Course Components Graded Component Image: Lecture Image: Lecture Image: Seminar Image: Lecture Image: Recitation Image: Lecture Image: Lab Image: Lecture Image: Discussion Image: Lecture	Terms Typically Offered ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer
Cognizent Society	
Cognizant Faculty Member Name: Snasha Zou Cognizan	Traculty Member Title:
Contact Person: Punam Vyas Email: vyas@umich.edu	Phone: 647-1754
Committee Representative:	:: Achilleas Anastasopoulos Date: 7/20/23
CoE Curriculum Committee Chair: Print	:: Date:
Home Department Chair:	Aaron Ridley Date: 05/12/23
Cross-Listed Department Chair: Heat Home 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 Course Description** General principles of magnetohydrodynamics; theory of General principles of magnetohydrodynamics; theory of the expanding atmospheres; properties of solar wind, the expanding atmospheres; properties of solar wind, interaction of solar wind with the magneto-sphere of the interaction of solar wind with the magneto-sphere of the Earth and other planets; bow shock and magnetotail, Earth and other planets; bow shock and magnetotail, trapped particles, auroras trapped particles, auroras. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 3 3 Contact hours (recitation) Contact hours (recitation) Contact hours (lab) Contact hours (lab)

Additional Info:

<u>Submitted by:</u> Cross-listed dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:



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 Dept (Home): Nuclear Engin & Radiolog Sci Subject: NERS Subject: NERS Catalog: 575 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) Course Title (full title) Plasma Generation and Diagnostics Laboratory Plasma Generation and Diagnostics Laboratory Abbreviated Title (20 char) Abbreviated Title (20 char) Plasma Lab 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** Half Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Min: Graduate Min: Graduate Max: 4 Undergraduate Max: 4 Undergraduate Max: Graduate Max: **Course Credit Type** Undergraduate Student, Rackham Graduate Student Repeatability □ Course is Repeatable for Credit □ Course is Y graded Maximum number of repeatable credits: \Box Can be taken more than once in the same term

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Fax: 734.936.3148

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				99	
Sub	ject: 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 O Instructor Con No Consent 	Drop Conse Consent	nt ment Consent tor Consent nsent	
	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 co) urse on electromagnetism.	
	EnforcedlPrerequisitel(254Lchar)		EnforcedIPrerequisitel(254Ichar)		
	Credit Exclusions		Credit Exclusions		
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componer	It Terms Typic ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/S	ally Offered ummer	
Cog	nizant Faculty Member Name: Ryan N	ИсBride	Cognizant Faculty Member Title	::	
SIGI Con	NATURES ARE REQUIRED FROM ALL	DEPARTMENTS INVOLV Email:Vyas@umich.ed	ED (Please Print AND Sign Name	?) 754	
CoE Con	Curriculum Imittee Representative:	ganty	Print: Achilleas Anastasopo	ulos Date: 7/20/23	
CoF	Curriculum Committee Chair:		Print:	Date:	

DEPARTMENTAL/COLLEGE US	SE ONLY
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Print: Todd R Allen

Print:

Print:

Print: Heath Hofmann

Date:12 May 2023

Date:7/20/23

Date:

Date:

Todd Allen

Heath Hofman

Home Department Chair:

Cross-Listed Department Chair:

Cross-Listed Department Chair:

Cross-Listed Department Chair:

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

Contact hours (lecture): 3

Contact hours (recitation)

Contact hours (lab) 1

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.

Requested:

Class Length Full term

Contact hours (lecture): 3

Contact hours (recitation)

Contact hours (lab) 1

Additional Info:

Submitted by: Cross-listed dept

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

Special resources of facilities required for this course:

Supporting statement:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Action Requested				
	New Course Modification of Existing	Date of Submission: 2023-05-24		
	Course	Effective Term: Fall 2024		
	Deletion of Existing Course			
	Course Official	RO USE ONLY		
_	Course Offered	Date Received:		
КI		Date Completed:		
		Completed By:		

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTIN	IG	
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 520		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 520			
	Course is Cre	oss-Listed with Othe	er Departments	Course is Cr	ross-Listed with Oth	er Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	tle)		Course Title (full title)		
	Solid State P	hysics		Solid State Physics		
	Abbreviated Title ((20 char)		Abbreviated Title (20 char)		
	SOLID STATE					
	Crystal struc dimensional condu	ture; Phonons; Intr uctor; Electronic str	oduction to Quantu oduction to Quantu ucture – Energy ban	m Mechanics; Free e ds; Properties of ser	electron Fermi gas; I niconductors; Diele	Low ctrics response;
	Light absorption a	nd emission; Magne	etic effects; Superco	nductivity.		
	Full Term Credit Ho	ours		Half Term Credit H	ours	
	Undergraduate Mi	in: 4 Graduat	e Min: 4	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate Ma	ax: 4 Graduat	e Max: 4	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type					
	Undergraduate S	Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student				
	Repeatability					
	Course is Repeared	eatable for Credit		Course is Y grad	ed	
Ш	Maximum number of repeatable credits:			\square Can be taken more than once in the same term		

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					102	
Subj	ect: Elec Engin & Computer Sci Cat	alog: 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 C □ Instructor Cor ☑ No Consent	onsent Isent	Drop Consent Department Co Instructor Conse No Consent 	nsent ent	
	CURRENT LISTING		REQUESTI	ED LISTING		
	Advisory Prerequisite (254 char)		Advisory F	Prerequisite (254 char)		
	Phys 453 or Graduate Standing		Phys	453 or Graduate Standing		
	Enforced Prerequisite (254 char)		Enforced I	Prerequisite (254 char)		
	Minimum grade requirement:	Minimum grade requirement:				
	Credit Exclusions		Credit Exc	lusions		
	Course Components Graded Component		nt Terms Typically Offered			
			☑ Fall			
_	□ Seminar			☑ Winter		
			SpringSummer			
	 Discussion 					
	Independent Study			Spring/Summer		
Cog	nizant Faculty Member Name: Zhaohui Z	Zhong	Cognizant	Faculty Member Title:		
SIG	NATURES ARE REQUIRED FROM ALL DEF	PARTMENTS INVOLV	ED (Please	Print AND Sign Name)		
Con	tact Person: Nancy Slowey Em	nail: nslowey@umich	n.edu	Phone: 734-763-2305		
CoE Com	Curriculum mittee Representative:	operty	Print:	Achilleas Anastasopoulos	Date: 7/14/23	
CoE	Curriculum Committee Chair:		Print:		Date:	
Hon	ne Department Chair: Heath Isfm	an	Print:	Heath Hofmann	Date:7/14/23	
Cros	ss-Listed Department Chair:		Print:		Date:	

Cross-Listed Department Chair:

Cross-Listed Department Chair:

DEPARTMENTAL/COLLEGE	USE	ONLY
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Print:

Print:

Date:

Date:

Requested:

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



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested			
	New Course	Data of Submission: 2022 05 24		
	Modification of Existing	Effective Term: Foll 2024		
Course				
	Deletion of Existing Course			
	Course Offerred	RO USE ONLY		
	✓ Indefinitely	Date Received:		
КI		Date Completed:		
		Completed By:		

CURRENT USTING

	CURRENT LISTING			REQUESTED LISTIN	IG	
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 521		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 521			
	Course is Cr	oss-Listed with Othe	er Departments	🗆 Course is Ci	oss-Listed with Oth	er Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
п	Course Title (full ti	tle)		Course Title (full title)		
_	Solid State D	Devices		Solid State Devices		
п	Abbreviated Title (20 char)			Abbreviated Title (20 char)		
_	Solid State Devices			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 ar large signal behavior				g or high speed g current and odels for small and	
	Full Term Credit H	ours		Half Term Credit H	ours	
	Undergraduate Mi	in: 3 Graduat	e Min: 3	Undergraduate Mi	n: Graduate	e Min:
	Undergraduate Ma	ax: 3 Graduat	e Max: 3	Undergraduate Max: Graduate Max:		e Max:
	Course Credit Type Undergraduate Student, Rackham Graduate Student					
	Repeatability					
	Course is Repeared	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits:		□ Can be taken more than once in the same term			

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				105
Sub	ject: Elec Engin & Computer Sci Cat	alog: 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 C □ Instructor Con ☑ No Consent	Drop Consent Consent	ent t
	CURRENT LISTING		REQUESTED LISTING	
	Advisory Prerequisite (254 char) EECS 421		Advisory Prerequisite (254 char) EECS 421	
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)	
	Minimum grade requirement:		Minimum grade requirement:	
	Credit Exclusions		Credit Exclusions	
	Course Components Lecture Seminar 	Graded Componen ☑	Terms Typically Offered ☑ Fall	I
_			☑ Winter	

□ Spring

Cognizant Faculty Member Title:

□ Summer

□ Spring/Summer

□ Recitation

□ Discussion

□ Independent Study

Cognizant Faculty Member Name: Wei Lu

🗆 Lab

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: Heath Home	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:			

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.

<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested		
	New Course	Data of Submission: 2022-05-24	
Modification of Existing		Effective Term: Fall 2024	
	Course		
	Deletion of Existing Course		
	Course Offerred	RO USE ONLY	
Ø	 ☑ Indefinitely □ One term only 	Date Received:	
		Date Completed:	
		Completed By:	

CURRENT LISTING

	CURRENT LISTING		REQUESTED LISTING				
Ø	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 Half Term Credit Hours						
	Undergraduate M	in: ³ Graduat	e Min: ³	Undergraduate Mi	n: Graduat	e Min:	
	Undergraduate Ma	ax: 3 Graduat	e Max: 3	Undergraduate Ma	ax: Graduat	e Max:	
	Rackham Gradu	e ate Student, Under	graduate Student				
	Repeatability						
	Course is Repeatable for Credit		Course is Y graded				
	Maximum number of repeatable credits:		Can be taken more than once in the same term				

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Sub	ject: Elec Engin & Computer Sci Cata	alog: 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 C Instructor Cor No Consent 	Consent Isent	Drop Consent Department Consent Instructor Consent No Consent
	CURRENT LISTING		REQUESTED LI	STING
2	Advisory Prerequisite (254 char) EECS 411, EECS 421 or EECS 521,		Advisory Prere EECS 411, EEC	quisite (254 char) S 421 or ECE 521.
]	Enforced Prerequisite (254 char)		Enforced Prere	quisite (254 char)
	Minimum grade requirement:		Minimum grad	e requirement:
	Credit Exclusions		Credit Exclusio	ns
	Course Components	Graded Componer	nt	Terms Typically Offered

Cog	nizant Faculty Member Name:	Amir Mortazawi	Cognizant Faculty Member Title:
	Independent Study		
	Discussion		□ Summer
	🗆 Lab		
	Recitation		
			□ Winter

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

 \checkmark

Contact Person: Nancy Slowey

☑ Lecture

□ Seminar

Email: nslowey@umich.edu

Phone: 734-763-2305

☑ Fall

CoE Curriculum Committee Representative:	Print: Achilleas Anastasopoulos	Date: 7/24/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: Weath Homen	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/0	COLLEGE	USE	ONLY
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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

Contact hours (lab)

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.

<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	3
Contact hours (recitation)	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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested	
New Course		Data of Submission: 2022-05-24
Modification of Existing	Effective Term: Foll 2024	
Course		Date of Submission: 2023-05-24 Effective Term: Fall 2024 RO USE ONLY Date Received: Date Completed: Completed Buy
	Deletion of Existing Course	
		RO USE ONLY
Ø		Date Received:
	 Indefinitely One term only 	Date Completed:
		Completed By:

CURRENT USTING

	CURRENT LISTING		REQUESTED LISTING			
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 526		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 526			
	Course is Cr	oss-Listed with Oth	er Departments	Course is Ci	oss-Listed with C	other Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti Plasmonics	tle)		Course Title (full title)		
	Abbreviated Title	(20 char)		Abbreviated Title (20 char)		
	Plasmonics		Plasmonics			
	Course Description (Please limit to 50 words and attach so This is the study of optical phenomena related to th will provide basic knowledge to understand and apply pri nanofabrication and characterization techniques. Optical, applications of plasmonics will be discussed.		eparate sheet if neco ne electromagnetic r nciples of plasmonic electronic, magneti	essary) esponse of cond is. Students will b ic, thermal and b	uctors. This course le introduced to comedical	
	Full Term Credit H	ours		Half Term Credit H	ours	
	Undergraduate Mi	in: 3 Graduat	e Min: 3	Undergraduate Mi	n: Gradu	iate Min:
	Undergraduate Ma	ax: 3 Graduat	e Max: 3	Undergraduate Ma	ax: Gradu	late iviax:
	Course Credit Type Undergraduate Student, Rackham Graduate Student, N		on-Rackham Gradua	te Student		
	Repeatability					
	Course is Repeared	eatable for Credit		Course is Y grad	ed	
	Maximum number of repeatable credits:			🗆 Can be taken m	ore than once in	the same term

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Phone: 734.763.2113

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Subi	act: Elac Engin & Computer Sci Ca	talog: 526		111
Subj	ect. Elec Englit & Computer Sci Ca	talog. 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 C Instructor Consent 	Drop Conser Consent	nt ment Consent tor Consent sent
	CURRENT LISTING		REQUESTED LISTING	
	Advisory Prerequisite (254 char) EECS 230, Physics 240, graduate permission from the instructor	standing or	Advisory Prerequisite (254 char) EECS 230, Physics 240, grad permission from the instructor) duate standing or
	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 Componen	nt Terms Typica ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Su	ally Offered ummer
Cogr	nizant Faculty Member Name: Somin E	unice Lee	Cognizant Faculty Member Title	:
SIGN Cont	IATURES ARE REQUIRED FROM ALL DE	PARTMENTS INVOLV	ED (Please Print AND Sign Name n.edu Phone: 734-70) 63-2305
Com	mittee Representative:	<u>y</u>	Print: Achilleas Anastasopo	Date: 7/24/23
	Curriculum Committee Chair:		Print	Date:

Home Department Chair: Heath Hyman	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:

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.

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.

<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	3
Contact hours (recitation)	Contact hours (recitation)
Contact hours (lab)	Contact hours (lab)

Additional Info:

Submitted by: Home dept

<u>Describe how this course fits with the degree requirements:</u> 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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested	
	 New Course Modification of Existing Course 	Date of Submission: 2023-06-23 Effective Term: Fall 2024
Deletion of Existing Course		
	Course Offered	RO USE ONLY
Ø	✓ Indefinitely	Date Received:
		Date Completed:
		Completed By:

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTIN	IG	
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 528		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 528			
	Course is Cre	oss-Listed with Othe	er Departments	Course is Cr	oss-Listed with Oth	er Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	itle)		Course Title (full ti	tle)	
	Principles of	f Microelectronics P	rocess Technology	Principles of Microelectronics Process Technology		
	Abbreviated Title (20 char)		Abbreviated Title (20 char)			
	M-Elec Proc	Tech		M-Elec Proc Tech		
	Course Description (Please limit to 50 words and attach se Theoretical analysis of the chemistry and physics of fabrication. Topics include: semiconductor growth, materi models, thin film deposition, chemical etching, plasma etc processing and process modeling		eparate sheet if nece process technologie al characterization, ching, electrical cont	essary) es used in micro-election lithography tools, pl cact formation, micro	ctronics hoto-resist o-structure	
	Full Term Credit Ho	ours		Half Term Credit H	ours	
	Undergraduate Mi	in: 3 Graduat	e Min: 3	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate Ma	ax: 3 Graduat	e Max: 3	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type Undergraduate Student, Rackham Graduate Student					
	Repeatability					
	Course is Repeared	eatable for Credit		Course is Y grad	ed	
	Maximum number of repeatable credits:			Can be taken more than once in the same term		

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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 Conset Instructor Consent No Consent 	Drop Consent ent
CURRENT LISTING	REC	QUESTED LISTING
Advisory Prerequisite (254 char) EECS 421 and EECS 423	Adv	risory Prerequisite (254 char) EECS 421 and EECS 423
Enforced Prerequisite (254 char)	Enfo	orced Prerequisite (254 char)
Minimum grade requirement:	Min	nimum grade requirement:
Credit Exclusions	Cree	dit Exclusions
Course Components Image: Lecture Seminar Recitation Lab Discussion Independent Study	Graded Component	Terms Typically Offered Fall Winter Spring Summer Spring/Summer
ognizant Faculty Member Name: Jerzy Kan	icki Cog	nizant Faculty Member Title:
GNATURES ARE REQUIRED FROM ALL DEF	PARTMENTS INVOLVED (F	Please Print AND Sign Name)
ontact Person: Nancy Slowey En	nail: nslowey@umich.edu	Phone: 734-763-2305

Committee Representative:	Print: Achilleas Anastasopoulos	Date: 7/14/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: Heath Hofman	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:

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	COLLOL	ODE ONEI

Course Description Course Description Theoretical analysis of the chemistry and physics of Theoretical analysis of the chemistry and physics of process technologies used in micro-electronics fabrication. process technologies used in micro-electronics fabrication. Topics include: semiconductor growth, material Topics include: semiconductor growth, material characterization, lithography tools, photo-resist models, characterization, lithography tools, photo-resist models, thin film deposition, chemical etching, plasma etching, thin film deposition, chemical etching, plasma etching, electrical contact formation, micro-structure processing electrical contact formation, micro-structure processing and process modeling. and process modeling.

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.

115

Current:

Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 3 3 Contact hours (recitation) Contact hours (recitation) Contact hours (lab)



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested	
	 New Course Modification of Existing Course Deletion of Existing Course 	Date of Submission: 2023-06-23 Effective Term: Fall 2024
V	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 529		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 529			
	Course is Cre	oss-Listed with Othe	er Departments	Course is Cr	oss-Listed with Oth	er Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Semiconductor Lasers and LEDs			Semiconductor Lasers and LEDs		
_	Abbreviated Title (20 char)		Abbreviated Title (20 char)			
	Semi Las & Leds		Semi Las & Leds			
	Course Description (Please limit to 50 words and attach			eparate sheet if nece	essary)	
	Optical proc	esses in semicondu	ctors, spontaneous e	emission, absorption	n gain, stimulated er	nission. Principles
	of light-emitting di	lodes, including tran	lisient effects, spectr	al and spatial radiat	ion fields. Principles	ont offects
			fationships, radiatio	Half Tawa Cuadit II		ent enects.
_	Full lerm Credit Ho	ours Graduat	- Min. 2	Half Ierm Credit Hours		
	Undergraduate Mi	in: Graduat ax: Graduat	e Max: 3	Undergraduate Mi	n: Graduat av: Graduat	e Max:
	Course Credit Type					
	Rackham Graduate Student					
	Repeatability					
	Course is Repeared to the course is repea	eatable for Credit		Course is Y graded		
	Maximum number	r of repeatable cred	its:	🗆 Can be taken m	ore than once in the	e same term

1210 LSA Building

116

500 S. State Street

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Phone: 734.763.2113

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				117
Sub	ject: Elec Engin & Computer Sci Cat	alog: 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 C □ Instructor Con ☑ No Consent	Consent nsent	Drop Consent Department Consent Instructor Consent No Consent
	CURRENT LISTING		REQUESTED LISTI	NG
	Advisory Prerequisite (254 char) EECS 429		Advisory Prerequi EECS 429	isite (254 char)
r	i			

п	Enforced Prerequisite (254 char)	Enforced Prerequisite (254 char)	
	Minimum grade requirement:	Minimum grade requirement:	
	Credit Exclusions	Credit Exclusions	
	Course Components Graded Compone	nt Terms Typically Offer	ed
		☑ Fall	
		Winter	
		Spring	
	\Box Discussion \Box	🗆 Summer	
	□ Independent Study □	Spring/Summer	
Cog	nizant Faculty Member Name: Pallab Bhattacharya	Cognizant Faculty Member Title:	
SIGN	NATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOL	/ED (Please Print AND Sign Name)	
Cont	tact Person: Nancy Slowey Email: nslowey@umic	h.edu Phone: 734-763-2305	
CoE Com	Curriculum amittee Representative:	Print: Achilleas Anastasopoulos	Date: 7/20/23
CoE	Curriculum Committee Chair:	Print:	Date:
Hom	ne Department Chair: Next Haran	Print: Heath Hofmann	Date: 7/20/23
Cros	s-Listed Department Chair:	Print:	Date:
Cros	s-Listed Department Chair:	Print:	Date:

Cross-Listed Department Chair:

DEPARTMENTAL/COLLEGI	E USE ONLY
----------------------	------------

Print:

Date:

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

Contact hours (lab)

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.

<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	3
Contact hours (recitation)	Contact hours (recitation)

Additional Info:

Contact hours (lab)

Submitted by: Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested		
	New Course Modification of Existing	Date of Submission: 2023-06-26	
	Course	Effective Term: Fall 2024	
	Deletion of Existing Course		
	Course Offered	RO USE ONLY	
		Date Received:	
¥		Date Completed:	
		Completed By:	

CURRENT LISTING

ß	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 531		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 531			
	Course is Cre	oss-Listed with Oth	er Departments	🗆 Course is Cr	ross-Listed v	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)		20 char)		Abbreviated Title (20 char)		
	Antenna Thry&Des		Antenna Thry&Des			
	Course Description (Please limit to 50 words and attach s			eparate sheet if necessary)		
	Theory of tra	ansmitting and rece	iving antennas. Reci	procity. Wire antennas: dipoles, loops and traveling-wave		
	antennas. Analysis	and synthesis of lir	near arrays. Phased a	arrays. Input impeda	ince and me	ethod of moments. Mutual
	impedance. Aperto	ure antennas: slot, l	Babinet's principle. N	Aicrostrip antennas.	Horns, refl	ector and lens antennas.
	Full Term Credit Ho	ours		Half Term Credit Hours		
	Undergraduate Mi	n: 3 Graduat	e Min: 3	Undergraduate Mi	n:	Graduate Min:
	Undergraduate Ma	ax: 3 Graduat	e Max: 3	Undergraduate Ma	ax:	Graduate Max:
	Course Credit Type	5				
	Undergraduate Student, Rackham Graduate Student					
	Repeatability					
	Course is Repeared	eatable for Credit		Course is Y graded		
	Maximum number	r of repeatable cred	its:	🗆 Can be taken m	ore than on	ce in the same term

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REQUESTED LISTING

				120
Subj	iect: Elec Engin & Computer Sci Cat	alog: 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 C Instructor Cor No Consent	Consent nsent	Drop Consent Department Consent Instructor Consent No Consent
	CURRENT LISTING		REQUESTED LISTIN	IG
	Advisory Prerequisite (254 char) EECS 330		Advisory Prerequis EECS 330	ite (254 char)
	Enforced Prerequisite (254 char)		Enforced Prerequis	site (254 char)
	Minimum grade requirement:		Minimum grade re	quirement:
	Credit Exclusions		Credit Exclusions	
	Course Components	Graded Componer	nt	Terms Typically Offered
				□ Fall
_	□ Seminar			☑ Winter
				Spring
				□ Summer
	□ Discussion □ Independent Study			Spring/Summer

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

Cognizant Faculty Member Name: Leung Tsang

Contact Person: Nancy Slowey	Email: nslowey@umich.edu	Phone: 734-763-2305	
CoE Curriculum Committee Representative:	nationally Print:	Achilleas Anastasopoulos	Date: 7/21/23
CoE Curriculum Committee Chair:	Print:		Date:
Home Department Chair: Heath	L'Hyman 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:

Cognizant Faculty Member Title:

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



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested		
	 New Course Modification of Existing Course 	Date of Submission: 2023-06-26 Effective Term: Fall 2024	
Deletion of Existing Course			
	Course Offered	RO USE ONLY	
	☑ Indefinitely	Date Received:	
R		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 Cr	oss-Listed with Oth	er Departments	🗆 Course is C	ross-Listed with Oth	er Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full title)			Course Title (full title)		
_	Microwave Measurements Laboratory		Microwave Measurements Laboratory			
	Abbreviated Title (20 char) Mw Meas Lab		Abbreviated Title (20 char) Mw Meas Lab			
	Course Description	n (Please limit to 50	words and attach se	eparate sheet if nec	essary)	
	Advanced to	opics in microwave i	measurements: pow	er spectrum and no	oise measurement, ir	ntroduction to
	state-of-the-art m	icrowave test equip	ment, methods for r	neasuring the diele	ctric constant of mat	terials,
	polarimetric radar	r cross section meas	urements, near field	l antenna pattern m	easurements, electr	omagnetic
	emission measure	ement (EM compatik	oility). Followed by a	project that will inc	clude design, analysi	s, and
	construction of a r	microwave subsyste	m.			
	Full Term Credit H	ours		Half Term Credit Hours		
	Undergraduate M	in: Graduat	e Min: 3	Undergraduate M	in: Graduat	e Min:
	Undergraduate M	ax: Graduat	e Max: 3	Undergraduate M	ax: Graduat	e Max:
	Course Credit Type					
	Rackham Graduate Student					
	Repeatability					
	Course is Repeared	eatable for Credit		Course is Y graded		
	Maximum numbe	r of repeatable cred	its:	🗆 Can be taken m	ore than once in the	e same term

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Subject: Elec Engin & Computer Sci Ca	atalog: 533	123		
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 Co Instructor Cons No Consent	Drop Consent onsent		
CURRENT LISTING		REQUESTED LISTING		
Advisory Prerequisite (254 char)		Advisory Prerequisite (254 char) EECS 320 and graduate standing		
Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)		
Minimum grade requirement:		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 S	arabandi	Cognizant Faculty Member Title:		
SIGNATURES ARE REQUIRED FROM ALL D	EPARTMENTS INVOLVE	D (Please Print AND Sign Name)		

Contact Person: Nancy Slowey Email: nslowey@umich.edu		Phone: 734-763-2305	
CoE Curriculum Committee Representative:	markeoparty Print	t: Achilleas Anastasopoulos	Date: 7/14/23
CoE Curriculum Committee Chair:	Print	ıt:	Date:
Home Department Chair: Heath	Hufman Print	t: Heath Hofmann	Date: 7/14/23
Cross-Listed Department Chair:	Print	t:	Date:
Cross-Listed Department Chair:	Print	t:	Date:
Cross-Listed Department Chair:	Print	it:	Date:

Course Description Course Description Advanced topics in microwave measurements: power Advanced topics in microwave measurements: power spectrum and noise measurement, introduction to 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 radar cross section measurements, near field antenna pattern measurements, electromagnetic emission pattern measurements, electromagnetic emission measurement (EM compatibility). Followed by a project that will include design, analysis, and construction of a microwave subsystem. microwave subsystem. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 2 2 Contact hours (recitation)

Contact hours (lab) 1

Additional Info:

Submitted by: Home dept

Describe how this course fits with the degree requirements:

Current:

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.

Requested:

state-of-the-art microwave test equipment, methods for measuring the dielectric constant of materials, polarimetric measurement (EM compatibility). Followed by a project that will include design, analysis, and construction of a

Contact hours (recitation)

Contact hours (lab)

1



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Actio	on Requested			
 New Course Modification of Existing Course 		Date of Submission: 2023-05-24		
		Effective Term: Fall 2024		
	Deletion of Existing Course			
	Course Offerred	RO USE ONLY		
Ø	 ✓ Indefinitely □ One term only 	Date Received:		
		Date Completed:		
		Completed By:		

	CURRENT LISTING		REQUESTED LISTIN	IG		
Ŋ	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 534		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 534			
	Course is Cr	oss-Listed with Oth	er Departments	Course is Cr	ross-Listed with	n Other Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full t	itle)		Course Title (full ti	tle)	
	Analysis of E	Electric Power Distr	ibution Systems	Analysis of Electric Power Distribution Systems		
	and Loads	(20 -h)				
	Abbreviated litle (20 char) Distribution Systems		Distribution Systems			
	Course Description (Please limit to 50 words and attach s			pharate sheet if nece	ssarv)	
	This course	covers the fundame	entals of electric pow	er distribution syste	ems and electri	c loads. including
	distribution grid c	omponents, topolo	gies, and operationa	strategies; three-pl	nase unbalance	ed power flow; electric
	load modeling, an	alysis, and control;	and emerging topics	such as photovoltai	c and electric v	vehicle interconnection,
	distribution auton	nation, and advance	ed metering infrastru	cture.		
	Full Term Credit H	ours		Half Term Credit H	ours	
	Undergraduate M	in: 3 Gradua	te Min: 3	Undergraduate Mi	n: Gra	iduate Min:
	Undergraduate M	ax: 3 Gradua	te Max: 3	Undergraduate Ma	ax: Gra	iduate Max:
	Course Credit Type	e				
	Undergraduate	Student, Rackham	Graduate Student, N	on-Rackham Gradua	ite Student	
	Repeatability					
	Course is Report Course is Report Course is Report Course is Reported and the second secon	eatable for Credit		Course is Y grad	ed	
	Maximum number of repeatable credits:		Can be taken more than once in the same term			



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					126
Sub	ject: Elec Engin & Computer Sci Cat	alog: 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 C □ Instructor Cor ☑ No Consent	Consent Isent	Drop Consent Department Co Instructor Cons No Consent 	onsent sent
	CURRENT LISTING		REQUESTED	LISTING	
	Advisory Prerequisite (254 char)		Advisory Pre	requisite (254 char)	
	EECS 463 or Graduate Standing		EECS 46	of Graduate Standing	
			Linorecurre		
	Minimum grade requirement:		Minimum gr	ade requirement:	
	Credit Exclusions		Credit Exclus	ions	
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componer	nt	Terms Typically Offe ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer	ered
Cog	nizant Faculty Member Name: Johanna	Mathieu	Cognizant Fa	culty 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:
Hor	ne Department Chair: Heath H	fman	Print: He	eath Hofmann	Date:7/14/23
Cro	ss-Listed Department Chair:		Print:		Date:
Cro	ss-Listed Department Chair:		Print:		Date:
Cro	ss-Listed Department Chair:		Print:		Date:

	_			
DEPARTN	1ENTAL/C	OLLEGE	USE ON	ILY

Requested:

Course Description 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. infrastructure. Class Length Class Length Full term Full term

Contact hours (lecture): 3

Contact hours (recitation)

Contact hours (lab)

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

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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested			
New Course		Data of Submission, 2022 OF 24		
Modification of Existing	Effective Term: Fall 2024			
Course				
Deletion of Existing Course				
	Course Offerred	RO USE ONLY		
Ø	Course Offered	Date Received:		
		Date Completed:		
	□ One term only	Completed By:		

CURRENT LISTING

	CURRENT LISTING	i		REQUESTED LISTIN	IG	
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 535		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 535			
	🗆 Course is Cr	oss-Listed with Oth	er Departments	🗆 Course is Ci	ross-Listed with Oth	er Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full t	itle)		Course Title (full ti	tle)	
	Power System Dynamics and Control		Power System Dynamics and Control			
	Abbreviated Title	(20 char)		Abbreviated Title (20 char)		
	Pwr Sys Dyn&Control		Pwr Sys Dyn&Control			
	Course Description (Please limit to 50 words and attach s			eparate sheet if nece	essary)	
	The course i	introduces angle an	d voltage stability co	incepts and conside	rs control strategies	for improving
	dynamic performa	ance. It provides an	overview of nonline	ar dynamical system	is, Lyapunov metho	ds and bifurcation
	analysis. Models c	of dynamical devices	are developed. Sma	all disturbance (linea	ar) analysis techniqi	les are presented,
	along with method	ds for assessing larg	e disturbance (nonii	near) benavior.		
_	Full lerm Credit H	ours		Half lerm Credit H	ours	N 41
	Undergraduate M	In: 3 Graduat	e Min: 3	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate M	ax: 3 Graduat	e Max: 3	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type					
	Undergraduate	Student, Rackham (Fraduate Student, N	on-Rackham Gradua	ite Student	
	Repeatability					
	Course is Rep	eatable for Credit		Course is Y grad	ed	
	Maximum number of repeatable credits:		Can be taken more than once in the same term			

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		129
Subject: Elec Engin & Computer Sci Grading Basis Graded (A – E) Credit/No Credit Satisfactory/Unsatisfactory Pass/Fail Business Administration Gradin Not for Credit Not for Credit	Add Consent Department C Instructor Con No Consent	Drop Consent onsent
□ Degree Credit Only		
CURRENT LISTING		REQUESTED LISTING
Advisory Prerequisite (254 char)		Advisory Prerequisite (254 char)

	Advisory Prerequisite (254 char)		Advisory Prerequisite (254 char)	
	EECS 463, or permission of instructor or Graduate		EECS 463, or permission of instructor or Graduate	
	Instructor		Instructor	
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)	
	Minimum grade requirement:		Minimum grade requirement:	
]	Credit Exclusions		Credit Exclusions	
	Course Components	Graded Compone	nt Torms Typically Offored	
	☑ Lecture	\checkmark		
	Seminar		✓ Fall	
	Recitation			
	🗆 Lab			
	Discussion		Summer Guerran A	
	Independent Study		□ Spring/Summer	
Cognizant Faculty Member Name: Ian Hiskens		skens	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: Heath Hyman	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:

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

Contact hours (lecture):

3

Contact hours (recitation)

Contact hours (lab)

Requested:

<u>Course Description</u> 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

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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Actio	on Requested		
New Course	Data of Submission, 2022 OF 24		
Modification of Existing Course		Effective Terrey, Fell 2024	
		Ellective lefm: Fall 2024	
	Deletion of Existing Course		
		RO USE ONLY	
Ø	□ One term only	Date Received:	
		Date Completed:	
		Completed By:	

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
Ø	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 Cr	ross-Listed with Oth	er Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	tle)		Course Title (full title)		
	Power System Markets & Optimization		ization	Power System Markets & Optimization		
	Abbreviated Title (20 char)			Abbreviated Title (20 char)		
	Power Mark	ets		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					mic principles rational problems the context of real
	Full Term Credit H	ours		Half Term Credit Hours		
	Undergraduate Mi	in: 3 Graduat	e Min: 3	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate Ma	ax: 3 Graduat	e Max: 3	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type Undergraduate Student, Rackham Graduate Student, N			Ion-Rackham Graduate Student		
	Repeatability					
	Course is Repeared	eatable for Credit		Course is Y graded		
Ш	Maximum number of repeatable credits:			\Box Can be taken more than once in the same term		

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Subject: Elec Engin & Computer Sci C	atalog: 536	132
Grading Basis Graded (A – E) Credit/No Credit Satisfactory/Unsatisfactory Pass/Fail Business Administration Gradin 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	REQU	ESTED LISTING
Advisory Dronoguisite (254 abor)	Adviss	my Broroquisita (254 shar)

	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 ComponentsGraImage: LectureImage: Image:	aded Componer	nt Terms Typically Offered ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer	
Cognizant Faculty Member Name: Johanna Mathieu		hieu	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:	markeoparty Prir	nt: Achilleas Anastasopoulos	Date: 7/14/23
CoE Curriculum Committee Chair:	Prir	nt:	Date:
Home Department Chair:	the Hofman Prir	nt: Heath Hofmann	Date: 7/14/23
Cross-Listed Department Chair:	Prir	nt:	Date:
Cross-Listed Department Chair:	Prir	nt:	Date:
Cross-Listed Department Chair:	Prir	nt:	Date:

Requested:

This course covers the fundamentals of electric power

system markets, including the economic principles they

are based upon. It also covers the optimization methods

including economic dispatch, optimal power flow, and unit

commitment. Problems are placed in the context of real

required to solve planning and operational problems

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.

<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	3
Contact hours (recitation)	Contact hours (recitation)

Contact hours (lab)

Contact hours (lab)

Course Description

electricity markets.

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:



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

	CONNEITIEISTING			REQUESTED LISTING			
	Dept (Home): Elec	Dept (Home): Elec Engin & Computer Sci Subject: FFCS			Dept (Home): Electrical & Computer Engineering		
	Catalog: 538			Subject: ECE			
		catalog. 555					
	Course is Cross-Listed with Other Departments			Course is Cr	Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number	
	Applied Physics - APPPHYS - 550, Physics - PHYSICS - 650			Applied Physics - APPPHYS - 550, Physics - PHYSICS - 650			
	Course Title (full title)			Course Title (full title)			
	Optical Waves in Crystals			Optical Waves in Crystals			
	Abbreviated Title (20 char)			Abbreviated Title (20 char)			
-	Opt Wave Cr	rystals		Opt Wave Crystals			
	Course Description	Course Description (Please limit to 50 words and attach separate sheet if necessary)					
	Propagation	of laser beams: Ga	ussian wave optics a	nd the ABCD law. Manipulation of light by electrical,			
	acoustical waves; o	crystal properties ar	nd the dielectric tens	or; electro-optic, acousto-optic effects and devices.			
	Introduction to no	nlinear optics; harm	nonic generation, op	tical rectification, for	ur-wave mixing, self	-focusing and	
	self-phase modulat	tion.				-	
	Full Term Credit Ho	ours		Half Term Credit Hours			
	Undergraduate Mi	n: Graduate	e Min: 3	Undergraduate Mir	n: Graduate	Min:	
	Undergraduate Ma	ix: Graduate	e Max: 3	Undergraduate Ma:	x: Graduate	Max:	
	Course Credit Type						
	Rackham Gradua	ate Student					
	Repeatability						
	Course is Repe	atable for Credit		□ Course is Y graded			
	Maximum number of repeatable credits:			□ Can be taken more than once in the same term			

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				135
Sut	oject: Elec Engin & Computer Sci Cat	alog: 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 (Instructor Con No Consent	Drop Consent Consent	t Consent Consent
	CURRENT LISTING		REQUESTED LISTING	
	Advisory Prerequisite (254 char)		Advisory Prerequisite (254 char)	
	Enforced Prerequisite (254 char)		EECS 434 and Graduate standin Enforced Prerequisite (254 char)	g
	Minimum grado requirement			
	Credit Exclusions		Minimum grade requirement:	
	 Course Components ✓ Lecture Seminar Recitation Lab Discussion Independent Study 	Graded Componen	It Terms Typically C ☑ Fall □ Winter □ Spring □ Summer □ Spring/Summe	Offered
Cogi	nizant Faculty Member Name: Herbert W	/inful	Cognizant Faculty Member Title:	
Cont	act Person: Nancy Slowey Ema Curriculum mittee Representative:	ARTMENTS INVOLVE	E D (Please Print AND Sign Name) .edu Phone: 734-763-23 Print: Achilleas Anastasopoulos	05 Date: 7/14/23
CoE	Curriculum Committee Chair:		Print:	Date:
CoE	Eurriculum Committee Chair: e Department Chair: Heath Hofma	<i>m</i>	Print: Print: Heath Hofmann	Date: Date:7/14/23
loE (Curriculum Committee Chair: e Department Chair: Heath Hofma S-Listed Department Chair: Cook	m Kli	Print: Print: Heath Hofmann Print: Cag liyan KurdaK	Date: Date:7/14/23 Date: <i>8/14/11</i> 3
loE (lom	Curriculum Committee Chair: e Department Chair: Heath Hofma S-Listed Department Chair: Constant S-Listed Department Chair: Tom	m Kli a fa	Print: Print: Heath Hofmann Print: Cag liyan KurdaK Print: Tom Schwarz (Physics)	Date: Date: 7/14/23 Date: 8/14/123 Date: 8/11/23

Requested:

Course Description Course Description Propagation of laser beams: Gaussian wave optics and Propagation of laser beams: Gaussian wave optics and the ABCD law. Manipulation of light by electrical, 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. self-phase modulation. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 3 3

Contact hours (recitation)

Contact hours (lab)

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

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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested □ New Course ☑ Modification of Existing Course □ Deletion of Existing Course	Date of Submission: 2023-06-21 Effective Term: Fall 2024
Ŋ	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 Dept (Home): Electrical & Computer Engineering V Subject: EECS Subject: ECE Catalog: 539 Catalog: 539 Course is Cross-Listed with Other Departments Course is Cross-Listed with Other Departments Department Subject **Catalog Number** Department Subject **Catalog Number** Applied Physics - APPPHYS - 551, Physics - PHYSICS - 651 Applied Physics - APPPHYS - 551, Physics - PHYSICS - 651 Course Title (full title) Course Title (full title) Lasers Lasers Abbreviated Title (20 char) Abbreviated Title (20 char) Lasers 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** Half Term Credit Hours Undergraduate Min: Graduate Min: 3 **Undergraduate Min:** Graduate Min: Undergraduate Max: Graduate Max: 3 **Undergraduate Max:** Graduate Max: **Course Credit Type Rackham Graduate Student** Repeatability □ Course is Repeatable for Credit □ Course is Y graded Maximum number of repeatable credits: □ Can be taken more than once in the same term

Sub	ject: Elec Engin & Computer Sci	Catalage E20		130
500	Jeen Liee Engin & Computer Su	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 (□ Instructor Col ☑ No Consent	Drop Consent Consent □ Departmen nsent □ Instructor C ☑ No Consent	t Consent onsent
	CURRENT LISTING		REQUESTED LISTING	
Ø	Advisory Prerequisite (254 char) EECS 537 or 538 and Graduat	e standing.	Advisory Prerequisite (254 char)	ing
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)	ing.
	Minimum grade requirement			
	Credit Exclusions		Minimum grade requirement:	
	Course Components	Graded Componen	t Terms Typically O	fforod
	₩ Lecture			nereu
			☑ Winter	
			□ Summer	
			Spring/Summe	er
Cogn	izant Faculty Member Name: Almar	ntas Galvanauskas	Cognizant Faculty Member Title	
SIGN	ATURES ARE REQUIRED FROM ALL	DEPARTMENTS INVOLVE	D (Please Print AND Sign Name)	
			o (Flease Frint And Sign Name)	
Conta	act Person: Punam Vyas	Email:vyas@umich.edu	Phone:647-1754	
CoE C Comr	urriculum nittee Representative:	property	Print: Achilleas Anastasopoulos	Date: 7/14/23
CoE C	urriculum Committee Chair:		Print:	Date:
Home	Department Chair: Heart	Hofman	Print: Heath Hofmann	Date: 7/14/23
Cross	Listed Department Chair:	IKL	Print: Gagliyan Kurdak	Date: 8/14/13
Cross	Listed Department Chair:	- a fel-	Print: Tom Schwarz (Physics)	Date: 8/11/23
Cross-	Listed Department Chair:		Print:	Date:
			errester Constitution of Second Secon	

Current: **Requested:** Course Description Course Description Complete study of laser operation: the atom-field Complete study of laser operation: the atom-field interaction; homogeneous and inhomogeneous interaction; homogeneous and inhomogeneous broadening mechanisms; atomic rate equations; gain and saturation; laser oscillation; laser resonators, modes, and cavity equations; cavity modes; laser dynamics, cavity equations; cavity modes; laser dynamics, Q-switching and modelocking. Special topics such as Q-switching and modelocking. Special topics such as femto-seconds lasers and ultrahigh power lasers. femto-seconds lasers and ultrahigh power lasers. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 3

Contact hours (recitation)

Contact hours (lab)

broadening mechanisms; atomic rate equations; gain and saturation; laser oscillation; laser resonators, modes, and

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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	Action Requested					
	New Course Modification of Existing	Date of Submission: 2023-07-24 Effective Term: Fall 2024				
	Course					
	Deletion of Existing Course					
	Course Offered	RO USE ONLY				
	□ Indefinitely	Date Received:				
КI		Date Completed:				
		Completed By:				

CURRENT USTING

	CURRENT LISTING			REQUESTED LISTING			
Ø	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 Ci	Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number	
	Course Title (full ti	itle)		Course Title (full title)			
	Analysis of Societal Networks		Analysis of Societal Networks				
_	Abbreviated Title (20 char)			Abbreviated Title (20 char)			
	Anlys Soc Ne	etworks		Anlys Soc Networks			
	Course Description (Please limit to 50 words and attach separate sheet if In the modern world we depend on the efficiency of a myriad of se activities. This course analyzes them (how they are connected, how they				essary) al networks to trans n, and how processe	act many es and	
	transactions occur	r on them) using ma	thematical tools fro	m graph theory, line	ar algebra, probabi	lity and game	
	theory.						
	Full Term Credit H	ours		Half Term Credit Hours			
	Undergraduate M	in: 3 Graduat	e Min: 3	Undergraduate Mi	n: Graduat	e Min:	
	Undergraduate Ma	ax: 3 Graduat	e Max: 3	Undergraduate Ma	ax: Graduat	e Max:	
	Course Credit Type	е					
	Undergraduate	Student, Rackham (Graduate Student, N	on-Rackham Gradua	ite Student		
	Repeatability						
	Course is Repeated to Course is Repated to Course is Repeated t	eatable for Credit		Course is Y graded			
	Maximum number of repeatable credits:			Can be taken more than once in the same term			

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140

500 S. State Street

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			141
Sub	ject: Elec Engin & Computer Sci Cat	alog: 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 EEC	CS 453)	Credit Exclusions EECS 203 and (MATH 214 or EECS 453)	
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componer	nt Terms Typically Offered ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer	
Cognizant Faculty Member Name: Vijay Subramanian		ubramanian	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: Heath Hyman	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:

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

Contact hours (lab)

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.

<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	3
Contact hours (recitation)	Contact hours (recitation)

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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested	
	New Course	Date of Submission: 2023-05-24
	Modification of Existing	Effective Term: Fall 2024
	Course	
	Deletion of Existing Course	
	Course Offerred	RO USE ONLY
Ø	 ✓ Indefinitely □ One term only 	Date Received:
		Date Completed:
		Completed By:

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
Ø	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 Ci	ross-Listed with Otl	ner Departments	
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	itle)		Course Title (full ti	tle)	
	Information Theory		Information Theory			
]	Abbreviated Title (20 char)		Abbreviated Title (20 char)			
	Informatn Theory		Informatn Theory			
Course Description (Please limit to 50 words and attach separate sheet if nec			essary)			
	Measures o	f information, such	as entropy, conditio	nal entropy, mutual	and directed inform	nation and
	Kullback-Leibler di	ivergence; fundame	ntal limits to the per	formance of comm	unication systems,	including source
	coding (data comp	pression) and chann	el coding (reliable tr	ansmission through	noisy media); elem	entary source and
	channel coding techniques; information theoretic bounds to the performance of estimation/decision systems.				ision systems.	
	Full Term Credit H	ours		Half Term Credit H	ours	
	Undergraduate M	in: 3 Graduat	e Min: 3	Undergraduate Mi	n: Gradua	te Min:
	Undergraduate Ma	ax: 3 Graduat	e Max: 3	Undergraduate Ma	ax: Gradua	te Max:
	Course Credit Type	e				
	Undergraduate	Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student				
	Repeatability					
	Course is Repeatable for Credit		Course is Y graded			
	Maximum number of repeatable credits:		\Box Can be taken more than once in the same term			

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			144
Subj	ect: Elec Engin & Computer Sci Cat	alog: 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 C □ Instructor Con ☑ No Consent	Drop Consent onsent
	CURRENT LISTING		REQUESTED LISTING
V	Advisory Prerequisite (254 char) EECS 501		Advisory Prerequisite (254 char) ECE 501
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)
	Minimum grade requirement:		Minimum grade requirement:
	Credit Exclusions		Credit Exclusions
	Course Components	Graded Componen	t Terms Typically Offered ☑ Fall

Cognizant Faculty Member Name: Sandeep Pradhan		Sandeep Pradhan	Cognizant Faculty Member Title:					
	Independent Study							
	Discussion		Summer					
	🗆 Lab							
	Recitation							
	Seminar		□ Winter					

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

Contact Person	: Nancy	Slowey
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vey	Em

mail: 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 Hyman	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:
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.

Class Length Full term

Contact hours (lecture): 3

Contact hours (recitation)

Contact hours (lab)

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 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: Other

Special resources of facilities required for this course:

Supporting statement:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested			
	New Course	Data of Submission, 2022 07 25		
	Modification of Existing	Date of Subilitission. 2023-07-25		
	Course	Ellective leffit: Fall 2024		
	Deletion of Existing Course			
	Course Offerred	RO USE ONLY		
Z	 ∠ Indefinitely □ One term only 	Date Received:		
		Date Completed:		
		Completed By:		

CURRENT LISTING

REQUESTED LISTING Dept (Home): Elec Engin & Computer Sci Dept (Home): Electrical & Computer Engineering \checkmark Subject: EECS Subject: ECE Catalog: 551 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) Course Title (full title) Matrix Methods for Signal Processing, Data Matrix Methods for Signal Processing, Data Analysis and Machine Learning Analysis and Machine Learning Abbreviated Title (20 char) Abbreviated Title (20 char) Matrix Meth Sig Proc 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** Half Term Credit Hours Undergraduate Min: 4 Graduate Min: 4 Undergraduate Min: Graduate Min: Undergraduate Max: 4 Graduate Max: 4 Undergraduate Max: Graduate Max: **Course Credit Type** Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student Repeatability □ Course is Repeatable for Credit □ Course is Y graded Maximum number of repeatable credits: □ Can be taken more than once in the same term

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Suk	vject: Elec Engin & Computer Sci Cat	alog: 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

CIID	DEN	тыс	TINIC
CUN	NEIN	I LIJ	DAILING

_	CURRENT LISTING		REQUESTED LISTING	
	Advisory Prerequisite (254 cha	r)	Advisory Prerequisite (254 char)	
	EECS 351 and (C or better) or Graduate Standing		EECS 351 and (C or better) or Graduate Standing	
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)	
	Minimum grade requirement:		Minimum grade requirement:	
	Credit Exclusions		Credit Exclusions	
Ø	Students cannot earn creo	lit for both EECS 505 and	Students cannot earn credit for both ECE 505 and	
	EECS 551.		ECE 551.	
	Course Components	Graded Compone	nt Terms Typically Offered	
	☑ Lecture	\checkmark		
	Seminar			
	Recitation			
	🗆 Lab			
	Discussion			
	Independent Study		□ spring/summer	
Cognizant Faculty Member Name: Jeffrey Fessler		ffrey 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

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CoE Curriculum Committee Representative:	Print: Achilleas Anastasopoulos	Date: 7/25/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: Heath Hofman	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:

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



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Actio	on Requested			
	New Course	Date of Submission: 2023-05-24		
	Modification of Existing	Effective Term: Fall 2024		
	Course			
	Deletion of Existing Course			
	Course Offerred	RO USE ONLY		
	□ Indefinitely	Date Received:		
КI		Date Completed:		
		Completed By:		

CURRENT LISTING		REQUESTED LISTING				
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 554		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 554			
	Course is Cr	oss-Listed with Oth	er Departments	Course is Cr	oss-Listed with Oth	ner 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)		Abbreviated Title (20 char)		
	Dig Comm&	Codes		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 f error correction; channel capacity; digital modulation methods: PSK, MSK, FSK, QAM; matched filter recievers Performance analysis: power, bandwidth, data rate and error probability.				ration; noiseless channel codes for I filter recievers.	
	Full Term Credit H	ours		Half Term Credit Hours		
□ Undergraduate Min: 3 Grad		in: 3 Graduat	e Min: 3	Undergraduate Mi	n: Graduat	te Min:
	Undergraduate Ma	ax: 3 Graduat	e Max: 3	Undergraduate Ma	ax: Graduat	te Max:
	Course Credit Type Undergraduate Student, Rackham Graduate Student, N			Ion-Rackham Graduate Students		
	Repeatability					
	Course is Repe	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits:			Can be taken more than once in the same term		

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Ann Arbor, MI 48109-1382

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					150
Sub	ject: Elec Engin & Computer Sci Cat	alog: 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 C Instructor Con No Consent 	Consent nsent	Drop Consent Department Co Instructor Cons No Consent 	onsent ent
	CURRENT LISTING		REQUESTED LI	STING	
	Advisory Prerequisite (254 char) EECS 216 and EECS 301		Advisory Prere EECS 216	quisite (254 char) and EECS 301	
_	Enforced Prerequisite (254 char)		Enforced Prere	quisite (254 char)	
	Minimum grade requirement:	Minimum grade requirement:			
	Credit Exclusions		Credit Exclusio	ns	
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componer	nt	Terms Typically Offe ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer	red
Cog	nizant Faculty Member Name: Achilleas	Anastasopoulos	Cognizant Facu	lty Member Title:	
SIGI Con	NATURES ARE REQUIRED FROM ALL DEI tact Person: Nancy Slowey En	PARTMENTS INVOLV	'ED (Please Prin t	: AND Sign Name) Phone: 734-763-2305	
CoE Com	Curriculum nmittee Representative:	-	Print: Ach	illeas Anastasopoulos	Date: 7/22/23
CoE	Curriculum Committee Chair:		Print:		Date:
Hon	ne Department Chair: Heath Homan		Print: Hea	th Hofmann	Date:7/22/23
Cros	ss-Listed Department Chair:		Print:		Date:
Cros	ss-Listed Department Chair:		Print:		Date:

Cross-Listed Department Chair:

DEPARTMENTAL/COLLEGE USE ONLY

Print:

Date:

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



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	Action Requested				
	 New Course Modification of Existing 	Date of Submission: 2023-06-26			
	Course	Effective Term: Fall 2024			
Deletion of Existing Course					
	Course Offered	RO USE ONLY			
	☑ Indefinitely	Date Received:			
Ł		Date Completed:			
		Completed By:			

CURRENT USTING

CURRENT LISTING			REQUESTED LISTING				
Ø	Dept (Home): Elec Subject: EECS Catalog: 555	: Engin & Computer	Sci	Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 555			
	Course is Cr	oss-Listed with Oth	er Departments	Course is Ci	oss-Listed with Oth	er Departments	
	Department	Subject	Catalog Number	Department	Subject	Catalog Number	
_	Course Title (full t	itle)		Course Title (full ti	Course Title (full title)		
	Digital Com	munication Theory		Digital Communication Theory			
_	Abbreviated Title (20 char)			Abbreviated Title (20 char)			
	Digital Com	m Thry		Digital Comm Thry			
	Course Description Theory of di	n (Please limit to 50 igital modulation an	words and attach se d coding. Optimum	eparate sheet if necessary) receivers in Gaussian noise. Signal space and decision			
	theory. Signal desi	ign. Bandwidth and	dimensionality. Fund	damental limits in coding and modulation. Capacity and			
	cutoff rate. Block,	convolutional and t	rellis coding. Contin	uous phase modulat	ion. Filtered channe	els and	
	intersymbol interf	erence. Equalizatior	. Spread-spectrum.	Fading channels. Current topics.			
	Full Term Credit H	ours		Half Term Credit Hours			
	Undergraduate M	in: 3 Graduat	e Min: 3	Undergraduate Mi	n: Graduat	e Min:	
	Undergraduate M	ax: 3 Graduat	e Max: 3	Undergraduate Ma	ax: Graduat	e Max:	
	Course Credit Type						
	Undergraduate Student, Rackham Graduate Student						
	Repeatability						
	Course is Report Course is Report Course is Report Course is Reported and the second secon	eatable for Credit		Course is Y graded			
	Maximum numbe	r of repeatable cred	its:	\square Can be taken more than once in the same term			

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Sub	ject: Elec Engin & Computer Sci Cat	alog: 555		153
	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 C □ Instructor Cor ☑ No Consent	consent isent	Drop Consent Department Consent Instructor Consent No Consent
	CURRENT LISTING		REQUESTED LIST	ING
Z	Advisory Prerequisite (254 char)		Advisory Prerequ	uisite (254 char)
	EECS 501 and EECS 554		ECE 501 and ECE	554
	Enforced Prerequisite (254 char)		Enforced Prereq	uisite (254 char)
	Minimum grade requirement:		Minimum grade	requirement:
	Credit Exclusions		Credit Exclusions	3
	Course Components	Graded Componer	nt	Terms Typically Offered

	Course Components	Graded Componer	t Torms Typically Offored
	☑ Lecture	\checkmark	
	Seminar		□ Fall
	Recitation		
	🗆 Lab		
	Discussion		
	Independent Study		
Cognizant Faculty Member Name: Wayne Stark		e: 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: Heath Home	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:

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



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Actio	on Requested	
	New Course	Data of Cubmission, 2022 07 25
	Modification of Existing	Date of Submission: 2023-07-25
	Course	Effective ferm: Fail 2024
Deletion of Existing Course		
	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY
Ø		Date Received:
		Date Completed:
		Completed By:

CURRENT LISTING

	CURRENT LISTING	ì		REQUESTED LISTIN	NG	
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 556		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 556			
	Course is Cr	oss-Listed with Oth	er Departments	Course is Ci	ross-Listed with Ot	her Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	itle)		Course Title (full title)		
	Image Proce	essing		Image Proce	essing	
	Abbreviated Title (Image Proce	(20 char) essing		Abbreviated Title (20 char) Image Processing		
	Course Description (Please limit to 50 words and attach separate sheet if necessary)					
	Sampling, fi	Itering, 2D Fourier	ransforms, interpola	ition, edge detection, enhancement, denoising,		
	restoration, segme	entation, random fi	eld models of images	s, Bayesian methods	s, wavelets and spa	arsity models.
	Applications inclue	de optical imaging,	biomedical images, v	video and image con	npression. Student	t projects based on
	recent image proc	essing literature. Pr	ojects are overseen/	graded by faculty a	nd may also involv	e mentoring by
	representatives fro	om external organiz	ations.			
	Full Term Credit H	ours		Half Term Credit Hours		
	Undergraduate Mi	in: Gradua	te Min: 3	Undergraduate Mi	n: Gradua	ate Min:
	Undergraduate Ma	ax: Gradua	te Max: 3	Undergraduate Ma	ax: Gradua	ate Max:
п	Course Credit Type	e				
	Rackham Gradu	ate Student				
	Repeatability					
	Course is Repeared	eatable for Credit		Course is Y grad	ed	
	Maximum number of repeatable credits:		\square Can be taken more than once in the same term			

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	ect: Elec Engin & Computer Sci Cata 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 C Instructor Con No Consent	Drop Consent Consent	
	CURRENT LISTING		REQUESTED LISTING	
Ø	Advisory Prerequisite (254 char) EECS 501, Corequisite: (EECS 453 of	or EECS 551)	Advisory Prerequisite (254 char) ECE 501, Corequisite: (EECS 453 or ECE 551	
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)	
	Minimum grade requirement:		Minimum grade requirement:	
	Credit Exclusions		Credit Exclusions	
	Course Components Lecture Seminar Recitation Lab Discussion	Graded Componen	nt Terms Typically Offered ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer	
			Cognizant Faculty Member Title	

CoE Curriculum Committee Representative:	Print: Achilleas Anastasopoulos	Date: 7/25/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: Heath Hyman	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
DEFAILINIENTAL		

Current:

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 Class Length Full term Full term Contact hours (lecture): 3 3 Contact hours (recitation) Contact hours (lab)

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.

Requested:

Contact hours (lecture):

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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested	
	New Course	Date of Submission: 2023-07-25 Effective Term: Fall 2024
	Modification of Existing	
	Course	
	Deletion of Existing Course	
	Course Offered	RO USE ONLY
Ø		Date Received:
	\square Indefinitely	Date Completed:
	□ One term only	Completed By:

CURRENT LISTING

	CURRENT LISTING	i		REQUESTED LISTIN	IG	
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 557		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 557			
	Course is Cr	oss-Listed with Othe	er Departments	Course is Cr	oss-Listed with Otł	ner Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	itle)		Course Title (full ti	tle)	
	Communica	tion Networks		Communication Networks		
	Abbreviated Title (20 char)		Abbreviated Title (20 char)			
	Communication Net		Communication Net			
	Course Description (Please limit to 50 words and attach se		parate sheet if nece	essary)		
	System arch	itectures. Data link	control: error correc	tion, protocol analysis, framing. Message delay: Markov		
	processes, queuin	g, delays in statistica	al multiplexing, mult	iple users with rese	rvations, limited se	rvice, priorities.
	Network delay: Kle	einrock independen	ce, reversibility, traf	fic flows, throughpu	t analysis, Jackson	networks. Multiple
	access networks: A	ALOHA and splitting	protocols, carrier se	nsing, multi-access	reservations.	
	Full Term Credit H	ours		Half Term Credit Hours		
	Undergraduate Mi	in: Graduat	e Min: 3	Undergraduate Mi	n: Gradua	te Min:
	Undergraduate Ma	ax: Graduat	e Max: 3	Undergraduate Ma	ax: Gradua	te Max:
	Course Credit Type					
	Rackham Graduate Student					
	Repeatability					
	Course is Repeared to the course is repea	eatable for Credit		Course is Y grad	ed	
	Maximum number of repeatable credits:		□ Can be taken more than once in the same term			

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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	t Drop Consent nent Consent Department Consent or Consent Instructor Consent sent IN Consent
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	CURRENT LISTING		REQUESTED LISTING	
Ы	Advisory Prerequisite (254 char) Graduate standing, preceded by E	ECS 431 or	Advisory Prerequisite (254 char) Graduate standing, preceded by EECS 431 or	
	accompanied by EECS 501		accompanied by ECE 501	
_	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)	
	Minimum grade requirement:		Minimum grade requirement:	
	Credit Exclusions		Credit Exclusions	
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componer	L Point 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

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CoE Curriculum Committee Representative:	Print: Achilleas Anastasopoulos	Date: 7/25/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: Heath Hyman	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:

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



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested			
 New Course Modification of Existing Course 		Date of Submission: 2023-06-27		
		Effective Term: Fall 2024		
	Deletion of Existing Course			
	Course Offerred	RO USE ONLY		
Ø	□ One term only	Date Received:		
		Date Completed:		
		Completed By:		

CURRENT USTING

	CURRENT LISTING		REQUESTED LISTING			
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 558		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 558			
	Course is Cr	oss-Listed with Othe	er Departments	Course is Cr	oss-Listed with Oth	er Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	itle)		Course Title (full ti	tle)	
	Stochastic C	ontrol		Stochastic Control		
	Abbreviated Title (20 char)		Abbreviated Title (20 char)			
Ц	Stochastic Contrl		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 stochast systems, controlled Markov chains. Optimization of systems described by Markov processes; dynamic punder perfect and imperfect information, finite and infinite horizons. System identification: off-line, rec 			ochastic controlled amic programming ne, recursive.		
	Full Term Credit H			Half Term Credit Hours		
п	Undergraduate Mi	in: 3 Graduat	e Min: 3	Undergraduate Mi	n: Graduat	e Min:
_	Undergraduate Ma	ax: 3 Graduat	e Max: 3	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type Undergraduate Student, Rackham Graduate Student					
	Repeatability					
	Course is Repeared	eatable for Credit		Course is Y graded		
Ц	Maximum number of repeatable credits:		□ Can be taken more than once in the same term			

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Cub		tala a. 550		162		
Sub	Ject: Elec Engin & Computer Sci Ca	talog: 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 (Instructor Co No Consent 	Consent nsent	Drop Consent Department Consent Instructor Consent No Consent 		
CURRENT LISTING REQUESTED LISTING						
Ø	Advisory Prerequisite (254 char)		Advisory Prere	equisite (254 char)		
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)			
	Minimum grade requirement:		Minimum grad	de requirement:		
	Credit Exclusions		Credit Exclusio	ons		
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Component C C C C C C C C C C C C C	ht	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)						
Con	tact Person: Nancy Slowey El	mail: nslowey@umic	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: Head Human	Print: Heath Hofmann	Date:
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:
Cross-Listed Department Chair:	Print:	Date:

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



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested			
 New Course Modification of Existing Course 		Date of Submission: 2023-05-23		
		Effective Term: Fall 2024		
	Deletion of Existing Course			
	Course Offerred	RO USE ONLY		
Ø	□ One term only	Date Received:		
		Date Completed:		
		Completed By:		

	CURRENT LISTING		REQUESTED LISTING			
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 559		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 559		ngineering	
	Course is Cr	oss-Listed with Oth	er Departments	Course is Cr	oss-Listed with Oth	er Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	itle)		Course Title (full ti	tle)	
	Optimization Methods in Signal Processing and		Optimizatior	Optimization Methods in Signal Processing and		
	Machine Learning			Machine Learning		
1	Abbreviated Title (20 char)		Abbreviated Title (20 char)			
	Optim in Sig Pro ML		Optim in Sig	Pro ML		
Course Description (Please limit to 50 words and attach separate sheet if necessa			essary)			
	Theory and	application of optin	nization methods for	signal and image pr	rocessing and machi	ine learning
	problems. Algorithms include gradient-based methods, p			roximal methods, ar	nd duality-based me	thods.
	Applications inclue	de signal denoising,	compressed sensing	g, matrix completion	, robust regression,	and classifier
	design.					
	Full Term Credit H	ours		Half Term Credit H	ours	
	Undergraduate M	in: 3 Graduat	e Min: 3	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate Ma	ax: 3 Graduat	e Max: 3	Undergraduate Ma	ax: Graduat	e Max:
[Course Credit Type	е				
	Undergraduate	Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student				
	Repeatability					
	Course is Repe	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits:		\square Can be taken more than once in the same term			

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Sub	ject: Elec Engin & Computer Sci Cata	alog: 559			165
	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 C □ Instructor Cor ☑ No Consent	Consent Isent	Drop Consent Department Co Instructor Cons No Consent 	onsent sent
	CURRENT LISTING		REQUESTED L	ISTING	
	Advisory Prerequisite (254 char) EECS 551 or 505		Advisory Prere ECE 551	equisite (254 char) or 505	
	Enforced Prerequisite (254 char)		Enforced Prer	equisite (254 char)	
	Minimum grade requirement:		Minimum gra	de requirement:	
	Credit Exclusions		Credit Exclusio	ons	
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study 	Graded Componer	ıt	Terms Typically Offe ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer	ered
Cog	nizant Faculty Member Name: Qing Qu		Cognizant Fac	ulty Member Title:	
SIG SIG	NATURES ARE REQUIRED FROM ALL DEF tact Person: Nancy Slowey Em	PARTMENTS INVOLV	ED (Please Prir	nt AND Sign Name) Phone: 734-763-2	2305
CoE Con	Curriculum nmittee Representative:		Print: Acl	nilleas Anastasopoulos	Date: 7/19/23
CoE	Curriculum Committee Chair:		Print:		Date:

Home Department Chair:Yead YearPrint:Heath HofmannDate: 7/19/23Cross-Listed Department Chair:Print:Date:Cross-Listed Department Chair:Print:Date:Cross-Listed Department Chair:Print:Date:

Current:	Requested:
Course Description	<u>Course Description</u>
Theory and application of optimization methods for signal	Theory and application of optimization methods for signal
and image processing and machine learning problems.	and image processing and machine learning problems.
Algorithms include gradient-based methods, proximal	Algorithms include gradient-based methods, proximal
methods, and duality-based methods. Applications include	methods, and duality-based methods. Applications include
signal denoising, compressed sensing, matrix completion,	signal denoising, compressed sensing, matrix completion,
robust regression, and classifier design.	robust regression, and classifier design.
<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested New Course Modification of Existing Course Deletion of Existing Course 	Date of Submission: 2023-05-12 Effective Term: Fall 2024
\mathbf{K}	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
	Dept (Home): Mechanical Engineering Subject: MECHENG Catalog: 561			Dept (Home): Mechanical Engineering Subject: MECHENG Catalog: 561		
	Course is Cr	ross-Listed with Oth	er Departments	🗹 Course is C	ross-Listed wit	h Other Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
N	Elec Eng & Comp Sci - EECS - 561		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)		Abbreviated Title (20 char)		
	Course Description	n (Please limit to 50	words and attach se	parate sheet if nece	ys essarv)	
	Sampling and data reconstruction. Z-transforms an Modeling and identification. Analysis and design using rc Linear quadratic optimal control and state estimation. Qu			d state variable desc ot locus, frequency lantization and othe	riptions of disc response, and s r nonlinearities	crete-time systems. state space techniques. s.
	Full Term Credit H	ours		Half Term Credit Hours		
	Undergraduate Min: 3Graduate Min: 3Undergraduate Max: 3Graduate Max: 3		Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:		iduate Min: iduate Max:	
	Course Credit Type		Graduate Student			
	Repeatability					
	Course is Rep	eatable for Credit		Course is Y graded		
	Maximum number	r of repeatable cred	its:	□ Can be taken more than once in the same term		

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Sub	iect: Mechanical Engineering Cat	talog: 561		168
500		ulog. 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	Drop Consent onsent	onsent isent
	CURRENT LISTING		REQUESTED LISTING	
	Advisory Prerequisite (254 char) EECS 460 or ME461		Advisory Prerequisite (254 char) EECS 460 or ME461	
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)	
	Minimum grade requirement:		Minimum grade requirement:	
	Credit Exclusions		Credit Exclusions	
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Component	Terms Typically Off ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer	ered
Cog	nizant Faculty Member Name: Ram V	asudevan	Cognizant Faculty Member Title:	
SIG	NATURES ARE REQUIRED FROM ALL I	DEPARTMENTS INVOLVE	D (Please Print AND Sign Name)	
Con	tact Person: Punam Vyas	Email: vyas@umich.edu	Phone: 647-1754	
CoE Con	Curriculum amittee Representative:	anoparty	Print: Achilleas Anastasopoulos	Date:7/21/23
CoE	Curriculum Committee Chair:		Print:	Date:
Hon	ne Department Chair: 74	h	Print: Kazuhiro Saitou	Date: 5/13/2023
Cros	ss-Listed Department Chair: \Im	eath Hofman	Print: Heath Hofmann	Date: 7/21/23
Cros	ss-Listed Department Chair:		Print:	Date:
			Drint	Data

Current: **Requested: Course Description Course Description** Sampling and data reconstruction. Z-transforms and state Sampling and data reconstruction. Z-transforms and state variable descriptions of discrete-time systems. Modeling variable descriptions of discrete-time systems. Modeling and identification. Analysis and design using root locus, and identification. Analysis and design using root locus, frequency response, and state space techniques. Linear frequency response, and state space techniques. Linear guadratic optimal control and state estimation. guadratic optimal control and state estimation. Quantization and other nonlinearities. Quantization and other nonlinearities. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 3 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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested			
 New Course Modification of Existing Course 		Date of Submission: 2023-05-23		
		Effective Term: Fall 2024		
	Deletion of Existing Course			
	Course Offerred	RO USE ONLY		
		Date Received:		
КI		Date Completed:		
		Completed By:		

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 563			Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 563		
	Course is Cr	oss-Listed with Oth	er Departments	Course is Cr	ross-Listed with Oth	er Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	itle)		Course Title (full title)		
	Hybrid Systems Analysis and Control			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.				stem modeling achable sets, ons of convex	
	Full Term Credit H	ours		Half Term Credit H	ours	
	Undergraduate M	in: 3 Graduat	e Min: 3	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate Ma	ax: 3 Graduat	e Max: 3	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type Undergraduate Student, Rackham Graduate Student, N			on-Rackham Gradua	ite Student	
	Repeatability					
	Course is Repe	eatable for Credit		Course is Y graded		
	Maximum numbe	r of repeatable cred	its:	\Box Can be taken more than once in the same term		



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				171	
Subj	ect: Elec Engin & Computer Sci Cata	alog: 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 (Instructor Co No Consent 	Drop C Consent De nsent Ding Z No	onsent epartment Consent structor Consent o Consent	
	CURRENT LISTING		REQUESTED LISTING		
	Advisory Prerequisite (254 char) (EECS 562) or (EECS 560 and perm instructor)	ission of	Advisory Prerequisite (254 (ECE 562) or (ECE 560 instructor)	char) and permission of	
	Enforced Prerequisite (254 char) Minimum grade requirement:		Enforced Prerequisite (254 char)		
	Credit Exclusions		Credit Exclusions		
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componen	nt Terms ⁻	Typically Offered ter ng mer ng/Summer	
Cog	nizant Faculty Member Name: Necmiye (Ozay	Cognizant Faculty Member	Title:	
SIG	NATURES ARE REQUIRED FROM ALL DEP	ARTMENTS INVOLV ail: nslowey@	/ED (Please Print AND Sign N ወumich.edu Phone:	Name) 734-763-2305	
CoE Con	Curriculum mittee Representative:		Print: Achilleas Anasta	asopoulos Date: 7/19/	
CoE	Curriculum Committee Chair:		Print:	Date:	
Hon	ne Department Chair: Heath Homan		Print: Heath Hofmann	Date: 7/19/	
Cros	ss-Listed Department Chair:		Print:	Date:	
Cros	ss-Listed Department Chair:		Print:	Date:	

Cross-Listed Department Chair:

DEPARTMENTAL/COLLEGE USE ONLY

Print:

Date:

Current: **Requested: Course Description** Course Description Introduction to analysis and design of hybrid systems and Introduction to analysis and design of hybrid systems and hybrid control systems. Hybrid system modeling hybrid control systems. Hybrid system modeling formalisms, specifications (automata theory, temporal formalisms, specifications (automata theory, temporal logics), verification (barrier certificates, reachable sets, logics), verification (barrier certificates, reachable sets, abstraction-based methods) and control synthesis. abstraction-based methods) and control synthesis. Stability of switched/hybrid systems. Applications of Stability of switched/hybrid systems. Applications of convex geometry and convex optimization in control. convex geometry and convex optimization in control. Model-predictive control of hybrid systems. Model-predictive control of hybrid systems. Class Length Class Length Full term

Contact hours (lecture): 3

Contact hours (recitation)

Contact hours (lab)

Full term

<u>Contact hours (lecture):</u> 3

Contact hours (recitation)

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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested			
 New Course Modification of Existing Course 		Date of Submission: 2023-05-22		
		Effective Term: Fall 2024		
	Deletion of Existing Course			
	Course Offerred	RO USE ONLY		
		Date Received:		
КI	\square Indefinitely	Date Completed:		
		Completed By:		

CURRENT LISTING

	CORRENT LISTING					
ß	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 564			Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 564		
	Course is Cr	oss-Listed with Oth	er Departments	Course is Ci	oss-Listed v	vith Other Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	itle)		Course Title (full title)		
	Estimation, Filtering, and Detection		Estimation, Filtering, and Detection			
	Abbreviated Title ((20 char)		Abbreviated Title (20 char)		
	Estim,Filter8	&Detect		Estim,Filter&Detect		
	Course Description	n (Please limit to 50) words and attach se	eparate sheet if nece	essary)	
	Principles of	f estimation, linear	filtering and detection	on. Estimation: line	ar and nonli	inear minimum mean
	squared error esti	mation, and other s	strategies. Linear filt	ering: Wiener and Kalman filtering. Detection: simple,		
	composite, binary	and multiple hypo	theses. Neyman-Pea	arson and Bayesian a	approaches.	
	Full Term Credit H	ours		Half Term Credit Hours		
	Undergraduate Mi	in: 3 Gradua	te Min: 3	Undergraduate Mi	n: (Graduate Min:
	Undergraduate Ma	ax: 3 Gradua	te Max: 3	Undergraduate Ma	ax: (Graduate Max:
	Course Credit Type	е				
	Rackham Graduate Student, Undergraduate Student					
	Repeatability					
	Course is Repeared	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits:			\square Can be taken more than once in the same term		

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REQUESTED LISTING

				174
Sub	ject: Elec Engin & Computer Sci Cat	alog: 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 C □ Instructor Con ☑ No Consent	Drop onsent	Consent Department Consent nstructor Consent No Consent
	CURRENT LISTING		REQUESTED LISTING	
	Advisory Prerequisite (254 char) EECS 501		Advisory Prerequisite (25 ECE 501	4 char)
	Enforced Prerequisite (254 char)		Enforced Prerequisite (25	54 char)
_	Minimum grade requirement:		Minimum grade requirer	nent:
	Credit Exclusions		Credit Exclusions	
	Course Components	Graded Componen ☑	t Term ☑ Fal	s Typically Offered
_		_	☑ Wi	nter

□ Spring

 \Box Summer

□ Spring/Summer

 $\hfill\square$ Recitation

□ Discussion

Independent Study

🗆 Lab

Cognizant Faculty Member Name: Alfred Hero	Cognizant Faculty Member Title:				
SIGNATURES ARE REQUIRED FROM ALL DEPARTMEN	NTS INVOLVED (Please Print AND Sign Name)				
Contact Person: Nancy Slowey Email: nsl	lowey@umich.edu Phone: 734-763-23	305			
CoE Curriculum Committee Representative:	Print: Achilleas Anastasopoulos	Date: 7/22/23			
CoE Curriculum Committee Chair:	Print:	Date:			
Home Department Chair: Heath Hyman	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:			

Current:

Requested:

Course Description	Course Description
Principles of estimation, linear filtering and detection.	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.	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.	Neyman-Pearson and Bayesian approaches.
Class Length	Class Length
Full term	Full term
Contact hours (lecture):	Contact hours (lecture):
3	3
Contact hours (recitation)	Contact hours (recitation)

Contact hours (lab)

Additional Info:

Contact hours (lab)

Submitted by: Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested		
	New Course	Data of Submission, 2022 07 24	
Modification of Existing Course		Date of Submission. 2025-07-24	
		Effective ferm: Fall 2024	
	Deletion of Existing Course		
		RO USE ONLY	
		Date Received:	
M		Date Completed:	
	□ One term only	Completed By:	

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 565			Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 565		
	Course is Cr	oss-Listed with Othe	er Departments	Course is Cr	oss-Listed with Oth	er Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	tle)		Course Title (full title)		
_	Linear Feed	back Control System	IS	Linear Feedback Control Systems		
	Abbreviated Title (20 char) Lin Feedback Control		Abbreviated Title (20 char) Lin Feedback Control			
	Course Description	n (Please limit to 50	words and attach se	eparate sheet if necessary)		
	multivariable syste	ems. Purpose of fee	dback. Sensitivity, r	obustness, and desi	gn trade-offs. Desig	in formulations
	using both freque	ncy domain and stat	e space description	s. Pole placement/o	bserver design. Lin	ear quadratic
	Guassian based de	esign methous. Des	ign problems unique	e to multivariable sys	sterns	
	Full Term Credit He	ours		Half Term Credit H	ours	
	Undergraduate Mi	in: Graduat	e Min: 3	Undergraduate Mi	n: Graduate	e Min:
	Undergraduate Ma	ax: Graduat	e Max: 3	Undergraduate Ma	ax: Graduate	e Max:
	Course Credit Type Rackham Graduate Student					
	Repeatability					
	Course is Repe	eatable for Credit		Course is Y graded		
	Maximum number	r of repeatable cred	its:	\Box Can be taken more than once in the same term		

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	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 Consen Instructor Consent No Consent	Drop Consent Drop Consent Department Consent Instructor Consent No Consent
-	CURRENT LISTING	REQU	IESTED LISTING

	Advisory Prerequisite (254 char)A☑EECS 460 or Aero 348 or ME 461 and Aero 550		Advisory Prerequisite (254 char) EECS 460 or Aero 348 or ME 461 and Aero 550 (ECE	
Ø				
	(EECS 560) 5		560)	
	Enforced Prerequisite (254 char)		Enforced Prereguisite (254 char)	
		-		
	Minimum grade requirement:		Minimum grade requirement:	
Π	Credit Exclusions		Credit Exclusions	
ъ	credit for EECS 565 and Aero 580 not allowed		credit for ECE 565 and Aero 580 not allowed	
	Course Components	Graded Componer	nt Torms Typically Offered	
	☑ Lecture	\checkmark		
	Seminar		☑ Fall	
	Recitation			
	🗆 Lab			
	Discussion		□ Summer	
	Independent Study		□ Spring/Summer	
Cognizant Faculty Member Name: James Freudenberg		ames 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: Heath Hofman	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:

Current:

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

Contact hours (lecture): 3

Contact hours (recitation)

Contact hours (lab)

Requested:

<u>Course Description</u> 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

<u>Class Length</u> Full term

<u>Contact hours (lecture):</u> 3

Contact hours (recitation)

Contact hours (lab)

Additional Info:

Submitted by: Home dept

<u>Describe how this course fits with the degree requirements:</u> Tech Elective

Special resources of facilities required for this course:

Supporting statement:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested	
	New Course	Date of Submission: 2023-05-22
	Modification of Existing	Effective Term: Fall 2024
	Course	
	Deletion of Existing Course	
	Course Offerred	RO USE ONLY
Ø	 ✓ Indefinitely □ One term only 	Date Received:
		Date Completed:
		Completed By:

CURRENT LISTING

	CURRENT LISTING	i		REQUESTED LISTIN	IG		
	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 566		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 566				
	Course is Cr	oss-Listed with Oth	er Departments	Course is Ci	Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number	
	Course Title (full ti	itle)		Course Title (full ti	tle)		
	Discrete Event Systems		Discrete Event Systems				
	Abbreviated Title	(20 char)		Abbreviated Title (20 char)		
	Discrete Event Syst		enarate sheet if necessary)				
п	Course Description Modeling a	n (Please limit to 50 nalysis and control	of discrete event du	vnamical systems N	essary) Aodeling formalisms	s considered	
	include state mach	hines, Petri nets, an	d recursive processe	es. Supervisory cont	rol theory; notions	of controllable	
	and observable la	nguages. Analysis a	nd control of Petri n	ets. Communicatin	g sequential proces	ses. Applications	
	to database, mana	agement, manufact	uring, and communi	cation protocols.			
	Full Term Credit H	ours		Half Term Credit H	ours		
	Undergraduate Mi	in: Graduat	e Min: 3	Undergraduate Mi	n: Graduat	e Min:	
	Undergraduate Ma	ax: Graduat	e Max: 3	Undergraduate Ma	ax: Graduat	e Max:	
	Course Credit Type	е					
	Rackham Gradu	ate Student					
	Repeatability						
	Course is Repe	eatable for Credit		□ Course is Y grad	ed		
	Maximum number	r of repeatable cred	its:	🗆 Can be taken m	ore than once in the	e same term	

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Sub	ject: Elec Engin & Computer Sci Cat	alog: 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 Pre Grad St	erequisite (254 char) tanding
	Enforced Prerequisite (254 char)	Enforced Pre	erequisite (254 char)
	Minimum grade requirement:	Minimum gr	rade requirement:
	Credit Exclusions	Credit Exclus	sions

	Credit Exclusions		Credit Exclusions
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componen	nt Terms Typically Offered
Cognizant Faculty Member Name: Stephane Lafortune			Cognizant Faculty Member Title:

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

	Contact P	erson:	Nancy	SI
--	-----------	--------	-------	----

owey 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: Heath Hyman	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 ONL	Y
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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.

Class Length Full term

Contact hours (lecture):

3

Contact hours (recitation)

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 Contact hours (lecture): 3 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:



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

	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 Cr	ross-Listed with Oth	er Departments	🗆 Course is C	Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number	
	Course Title (full title)		Course Title (full title)				
	Randomnes	s and Computation		Randomness and Computation			
	Abbreviated Title (20 char)		Abbreviated Title (20 char)				
	Randomness and Comp			Randomness and Comp			
_	Course Description	n (Please limit to 50	words and attach se	eparate sheet if nece	essary)		
	Fundamenta	als of randomness a	nd its pervasive use	in computer science, including the probabilistic method,			
	the design and and	alysis of algorithms,	computational com	plexity, cryptograph	y, combinatorics, lo	gic and proof	
	systems, and relate	ed topics.					
	Full Term Credit H	ours		Half Term Credit Hours			
	Undergraduate Mi	in: 4 Graduat	e Min: 4	Undergraduate Mi	n: Graduat	e Min:	
	Undergraduate Ma	ax: 4 Graduat	e Max: 4	Undergraduate Max: Graduate Max:		e Max:	
	Course Credit Type						
	Undergraduate :	Student, Rackham G	iraduate Student, N	on-Rackham Gradua	te Student		
	Repeatability						
	Course is Repeatable for Credit		Course is Y graded				
	Maximum number of repeatable credits:			\Box Can be taken more than once in the same term			

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Drop Consent It Consent	onsent Isent			
REQUESTED LISTING				
Advisory Prerequisite (254 char) Coursework in probability and alg	orithms			
Enforced Prerequisite (254 char) EECS 376 (B+ or better, No OP/F); Standing Minimum grade requirement:	or Graduate			
Credit Exclusions				
hent Terms Typically Off ↓ Fall ↓ Winter ↓ Spring ↓ Summer ↓ Spring/Summer	ered			
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				
Print: Amir Kamil	Date: 5/17/23			
Print:	Date:			
Print:Emily Mower Provost	Date: 5/18/23			
Cross-Listed Department Chair: Print: Date:				
Cross-Listed Department Chair: Print: Date:				
Print:	Date:			
	It Consent Drop Consent Oppartment C Consent Instructor Cor Instructor Cor Instructor Cor Advisory Prerequisite (254 char) Coursework in probability and alg Enforced Prerequisite (254 char) EECS 376 (B+ or better, No OP/F); Standing Minimum grade requirement: Credit Exclusions Credit Exclusions Ient Terms Typically Official Spring Summer Spring Summer Spring/Summer Cognizant Faculty Member Title: PtVED (Please Print AND Sign Name) Junich.edu Phone: 647-1754 Print: Print: Emily Mower Provost Print: Print: Print: Print: Print: Print: Print:			

Current: **Requested: Course Description Course Description** Fundamentals of randomness and its pervasive use in Fundamentals of randomness and its pervasive use in computer science, including the probabilistic method, the computer science, including the probabilistic method, the design and analysis of algorithms, computational design and analysis of algorithms, computational complexity, cryptography, combinatorics, logic and proof complexity, cryptography, combinatorics, logic and proof systems, and related topics. systems, and related topics. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 4 4 Contact hours (recitation) Contact hours (recitation) Contact hours (lab) Contact hours (lab)

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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:



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

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 C	ross-Listed with Oth	er Departments	
Department	Subject	Catalog Number	Department	Subject	Catalog Number
Course Title (full title)		Course Title (full title)			
Computatio	nal Complexity		Computational Complexity		
Abbreviated Title (20 char)		Abbreviated Title (20 char)			
Computat C	omplexity		Computat Complexity		
Course Description	n (Please limit to 50	words and attach se	eparate sheet if necessary)		
Fundamenta	als of the theory of	computation and co	mplexity theory. Computability, undecidability, and logic.		
Relations betweer	n complexity classes	, NP-completeness,	P-completeness, and	d randomized comp	utation.
Applications in sel	ected areas such as	cryptography, logic	programming, theor	rem proving, appro»	imation of
optimization prob	lems, or parallel cor	nputing.			
Full Term Credit Hours			Half Term Credit Hours		
Undergraduate Mi	in: 4 Graduat	e Min: 4	Undergraduate Mi	n: Graduat	e Min:
Undergraduate Ma	ax: 4 Graduat	e Max: 4	Undergraduate Ma	ax: Graduat	e Max:
Course Credit Type	e				
Undergraduate Student, Rackham Graduate Student					
Repeatability					
🗆 Course is Rep	eatable for Credit		Course is Y graded		
Maximum number of repeatable credits:			\Box Can be taken more than once in the same term		

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Cub	ianti Flan Frazin & Computer Cai	Catalage 574		186
Sub	ject: 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 Instructor Co No Consent 	Drop Consent Consent	ent Consent Consent nt
	CURRENT LISTING		REQUESTED LISTING	
	Advisory Prerequisite (254 char) Coursework in probability ar	nd algorithms	Advisory Prerequisite (254 char) Coursework in probability and	algorithms
	Enforced Prerequisite (254 char) EECS 376 (B+ or better, No C Standing Minimum grade requirement:	P/F); or Graduate	Enforced Prerequisite (254 char) EECS 376 (B+ or better, No OP Standing Minimum grade requirement:	/F); or Graduate
	Credit Exclusions		Credit Exclusions	
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componen	nt Terms Typically ☑ Fall □ Winter □ Spring □ Summer □ Spring/Sum	offered
Cog	nizant Faculty Member Name: Mał	ndi Cheraghchi	Cognizant Faculty Member Title:	
SIGI	NATURES ARE REQUIRED FROM AL	L DEPARTMENTS INVOLV	ED (Please Print AND Sign Name)	
Con	tact Person: Punam Vyas	Email: vyas@umich.e	du Phone:734-647-2	1754
CoE Con	Curriculum nmittee Representative:	dinfland	Print: Amir Kamil	Date: 5/17/23
CoE	Curriculum Committee Chair:		Print:	Date:
Hon	ne Department Chair:	2no ga	Print: Emily Mower Provost	Date: 5/18/2
Cros	ss-Listed Department Chair:		Print:	Date:
Cros	ss-Listed Department Chair:		Print:	Date:
Cros	ss-Listed Department Chair:		Print:	Date:

Current:	Requested:
<u>Course Description</u>	Course Description
Fundamentals of the theory of computation and complexity	Fundamentals of the theory of computation and complexity
theory. Computability, undecidability, and logic. Relations	theory. Computability, undecidability, and logic. Relations
between complexity classes, NP-completeness,	between complexity classes, NP-completeness,
P-completeness, and randomized computation.	P-completeness, and randomized computation.
Applications in selected areas such as cryptography, logic	Applications in selected areas such as cryptography, logic
programming, theorem proving, approximation of	programming, theorem proving, approximation of
optimization problems, or parallel computing.	optimization problems, or parallel computing.
<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	3
<u>Contact hours (recitation)</u>	<u>Contact hours (recitation)</u>
1	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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Action Requested ☐ New Course ☑ Modification of Existing Course		Date of Submission: 2023-05-05 Effective Term: Fall 2024	
	Deletion of Existing Course		
\mathbf{V}	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:	

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
Ŋ	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 575		Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 575			
	Course is C	ross-Listed with Oth	ner Departments	🗆 Course is C	ross-Listed w	ith Other Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full t	itle)		Course Title (full title)		
	Advanced Cryptography			Advanced Cryptography		
	Abbreviated Title (20 char)		Abbreviated Title (20 char)			
	Adv Cryptography			Adv Cryptography		
_	Course Description (Please limit to 50 words and attach separate sheet if necessary)					
	A rigorous ii	ntroduction to the o	design of cryptosyste	ms and to cryptanalysis. Topics include cryptanalysis of		
	classical cryptosys	tems; theoretical a	nalysis of one-way fu	inctions; DES and di	fferential cry	ptanalysis; the RSA
	cryptosystem; EIG	amal, elliptic, hype	relliptic and hidden r	nononomial cryptos	ystems; attac	cks on signature schemes,
	identification sche	emes and authentic	ation codes; secret s	haring; and zero kno	owledge.	
	Full Term Credit Hours			Half Term Credit Hours		
	Undergraduate M	in: 4 Gradua	te Min: 4	Undergraduate Mi	n: G	raduate Min:
	Undergraduate M	ax: 4 Gradua	te Max: 4	Undergraduate Ma	ax: G	raduate Max:
	Course Credit Type	e				
	Undergraduate	Student, Rackham	Graduate Student			
Repeatability						
	☐ Course is Rep	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits:			\Box Can be taken more than once in the same term		

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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

REQUESTED LISTING

CURRENT 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 ComponentsGraded ComponentImage: LectureImage: LectureImage: SeminarImage: LectureImage: RecitationImage: LectureImage: LabImage: LectureImage: DiscussionImage: LectureImage: Independent StudyImage: Lecture	nt 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

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CoE Curriculum Committee Representative:	Confland)	Print:Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:	Emorph	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:

Current: **Requested: Course Description Course Description** A rigorous introduction to the design of cryptosystems and A rigorous introduction to the design of cryptosystems and to cryptanalysis. Topics include cryptanalysis of classical to cryptanalysis. Topics include cryptanalysis of classical cryptosystems; theoretical analysis of one-way functions; cryptosystems; theoretical analysis of one-way functions; DES and differential cryptanalysis; the RSA cryptosystem; DES and differential cryptanalysis; the RSA cryptosystem; ElGamal, elliptic, hyperelliptic and hidden mononomial ElGamal, elliptic, hyperelliptic and hidden mononomial cryptosystems; attacks on signature schemes, cryptosystems; attacks on signature schemes, identification schemes and authentication codes; secret identification schemes and authentication codes; secret sharing; and zero knowledge. sharing; and zero knowledge. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 3 3 Contact hours (recitation) Contact hours (recitation) 1 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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested New Course Modification of Existing Course Deletion of Existing Course 	Date of Submission: 2023-05-05 Effective Term: Fall 2024
Ŋ	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING			
N	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 576			Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 576			
	Course is C	ross-Listed with Oth	ner Departments	🗆 Course is C	Cross-Listed with	Other Departments	
	Department	Subject	Catalog Number	Department	Subject	Catalog Number	
	Course Title (full title) Advanced Data Mining			Course Title (full title) Advanced Data Mining			
	Abbreviated Title (20 char)		Abbreviated Title (20 char)				
		n (Please limit to 50	words and attach so	narate sheet if nec			
	Advanced to	poics in data mining	• A mix of lectures, r	eadings, and a semi	ester-long group i	project will	
	familiarize the students with recent methods for analyzing large-scale. real-world data and networks. and					works, and	
	applications in various domains (e.g., web science, social			science, neuroscien	ce).	,	
	Full Term Credit H	ours		Half Term Credit H	lours		
	Undergraduate M	in: Gradua	te Min: 4	Undergraduate M	in: Gradı	uate Min:	
	Undergraduate M	ax: Gradua	te Max: 4	Undergraduate M	ax: Gradu	uate Max:	
	Course Credit Type	e					
	Rackham Gradu	iate Student, Non-R	ackham Graduate St	udent			
	Repeatability						
	🗆 Course is Rep	eatable for Credit		Course is Y grade	□ Course is Y graded		
	Maximum number of repeatable credits:			🗆 Can be taken n	nore than once in	the same term	



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Sub	ject: Elec Engin & Computer Sci C	Catalog: 576		192	
	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 □ Instructor Co ☑ No Consent	Drop Cor Consent	isent artment Consent ructor Consent Consent	
	CURRENT LISTING		REQUESTED LISTING		
	Advisory Prerequisite (254 char) EECS 281 and (MATH 214 or 2 419, or ROB 101) and (STATS 412 or graduate standing. Enforced Prerequisite (254 char)	17 or 296 or 417 or MATH 425), or	Advisory Prerequisite (254 ch EECS 281 and (MATH 2 419, or ROB 101) and (STATS graduate standing.	nar) 14 or 217 or 296 or 417 or 412 or MATH 425), or	
	Minimum grade requirement: Credit Exclusions		Minimum grade requirement: Credit Exclusions		
Course Components Graded Compone Image: Lecture Image: Lecture Image: Seminar Image: Lecture Image: Recitation Image: Lecture Image: Lecture Imag		nt Terms Ty ☑ Fall ☑ Winte □ Spring □ Summ □ Spring	pically Offered r g ner g/Summer		
Cog	nizant Faculty Member Name: Danai k	Koutra	Cognizant Faculty Member T	itle:	
SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name) Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754					
COE	nmittee Representative:	dau	Print: Amir Kamil	Date: 5/17/23	
CoE	Curriculum Committee Chair:		Print:	Date:	
Hon	ne Department Chair:	KAN-	Print: Emily Mower Provo	Date: 5/18/23	
Cros	ss-Listed Department Chair:		Print:	Date:	
Cros	ss-Listed Department Chair:		Print:	Date:	

Print:

Date:

Cross-Listed Department Chair:

DEPARTMENTAL/COLLEGE USE ONLY

Current:	Requested:
<u>Course Description</u>	Course Description
Advanced topics in data mining. A mix of lectures,	Advanced topics in data mining. A mix of lectures,
readings, and a semester-long group project will	readings, and a semester-long group project will
familiarize the students with recent methods for analyzing	familiarize the students with recent methods for analyzing
large-scale, real-world data and networks, and	large-scale, real-world data and networks, and
applications in various domains (e.g., web science, social	applications in various domains (e.g., web science, social
science, neuroscience).	science, neuroscience).
Class Length	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	3
<u>Contact hours (recitation)</u>	<u>Contact hours (recitation)</u>
1	1

Contact hours (lab)

Additional Info:

Contact hours (lab)

Submitted by: Home dept

Describe how this course fits with the degree requirements:

<u>Special resources of facilities required for this course:</u> Flux resources (Hadoop / Spark queue)

Supporting statement:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested □ New Course ☑ Modification of Existing Course □ Deletion of Existing Course	Date of Submission: 2023-05-05 Effective Term: Fall 2024
V	Course Offered Indefinitely One term only	RO USE ONLY Date Received: Date Completed: Completed By:

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
N	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 582			Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 582		
	🗆 Course is Cr	ross-Listed with Oth	er Departments	🗆 Course is C	ross-Listed with Ot	ther Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full title)		Course Title (full title)			
	Advanced Operating Systems		Advanced Operating Systems			
	Abbreviated Title (20 char)			Abbreviated Title (20 char)		
	Adv Operati	ing Sys		Adv Operating Sys		
	Course Description	n (Please limit to 50	words and attach se	eparate sheet if nece	essary)	
	Course discu	usses advanced topi	cs and research issu	es in operating systems. Topics will be drawn from a		
	variety of operatin	ng systems areas suc	ch as distributed syst	tems and languages,	networking, secur	rity and protection,
	real-time systems,	modeling and anal	ysis, etc.			
	Full Term Credit Ho	ours		Half Term Credit Hours		
	Undergraduate Mi	in: 4 Graduat	e Min: 4	Undergraduate Mi	n: Gradua	ite Min:
	Undergraduate Ma	ax: ⁴ Graduat	e Max: 4	Undergraduate Max: Graduate Max:		ite Max:
	Course Credit Type	2				
	Undergraduate	Student, Rackham (Graduate Student			
	Repeatability			_		
	☐ Course is Rep	eatable for Credit		□ Course is Y grac	led	
	Maximum number of repeatable credits:			🗆 Can be taken m	ore than once in t	he same term

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			195
Subj	ect: 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 Instructor Co No Consent 	Drop Consent Consent
	CURRENT LISTING		REQUESTED LISTING
	Advisory Prerequisite (254 char) EECS 482/EQ		Advisory Prerequisite (254 char) EECS 482/EQ
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)
	Minimum grade requirement:		Minimum grade requirement:
	Credit Exclusions		Credit Exclusions
	Course Components Course Components Lecture Seminar	Graded Componer	Terms Typically Offered ☑ Fall ☑ Winter

□ Spring

Cognizant Faculty Member Title:

□ Summer

Phone: 647-1754

□ Spring/Summer

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

Email:vyas@umich.edu

□ Recitation

□ Discussion

Contact Person: Punam Vyas

□ Independent Study

Cognizant Faculty Member Name: Baris Kasikci

🗌 Lab

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:

Course Description Course Description Course discusses advanced topics and research issues in Course discusses advanced topics and research issues in operating systems. Topics will be drawn from a variety of operating systems. Topics will be drawn from a variety of operating systems areas such as distributed systems and operating systems areas such as distributed systems and languages, networking, security and protection, real-time languages, networking, security and protection, real-time systems, modeling and analysis, etc. systems, modeling and analysis, etc. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 4 4 Contact hours (recitation) Contact hours (recitation) Contact hours (lab) Contact hours (lab)

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Requested:

Additional Info:

Submitted by: Home dept

Describe how this course fits with the degree requirements:

Current:

Special resources of facilities required for this course:

Supporting statement:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on 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

	CURRENT LISTING			REQUESTED LISTING			
N	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 583			Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 583			
	\Box Course is C	ross-Listed with O	ther Departments	🗆 Course is C	Cross-Listed with Ot	ther Departments	
	Department	Subject	Catalog Number	Department	Subject	Catalog Number	
	Course Title (full title)			Course Title (full title)			
	Advanced C	ompilers		Advanced Compilers			
	Abbreviated Title (20 char) Advanced Compilers			Abbreviated Litle (20 char) Advanced Compilers			
	Course Description	n (Please limit to !	50 words and attach se	eparate sheet if necessary)			
	In-depth stu	udy of compiler ba	ckend design for high	-performance archit	ectures. Topics incl	ude control-flow	
	and data-flow ana	alysis, optimizatior	n, instruction schedulin	ng, register allocatio	n. Advanced topic	s include memory	
	hierarchy management, instruction-level parallelism, pre			licated and speculat	ive execution. The	class focus is	
	processor-specific	compilation tech	niques, thus familiarit	y with both compute	er architecture and	compilers is	
	recommended.						
	Full Term Credit H	ours		Half Term Credit H	lours		
	Undergraduate M	in: 4 Gradu	ate Min: 4	Undergraduate M	in: Gradua	ite Min:	
	Undergraduate M	ax: 4 Gradu	ate Max: 4	Undergraduate Ma	ax: Gradua	ite Max:	
	Course Credit Type	e					
	Undergraduate	Student, Rackham	n Graduate Student, N	on-Rackham Gradua	ate Student		
	Repeatability			_			
	🗆 Course is Rep	peatable for Credit		Course is Y grad	Course is Y graded		
	Maximum number of repeatable credits:			🗋 Can be taken m	ore than once in t	he same term	

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Subj	iect: 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 (Instructor Co No Consent	Consent nsent	Drop Consent Department Co Instructor Cons No Consent	nsent ent
	CURRENT LISTING		REQUESTED	LISTING	
	Advisory Prerequisite (254 char) EECS 281 and 370 (EECS 483	is also recommended)	Advisory Pre EECS 28	requisite (254 char) 1 and 370 (EECS 483 is also	recommended)
_	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)		
	Minimum grade requirement:		Minimum grade requirement:		
	Credit Exclusions		Credit Exclusions		
	Course Components Course Components Course Components Seminar Recitation Lab Discussion Independent Study	Graded Componer	nt	Terms Typically Offe ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer	red
Cog	nizant Faculty Member Name: Scot	t 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 Con	Curriculum nmittee Representative:	antau	Print:Am	ir Kamil	Date: 5/17/23
CoE	Curriculum Committee Chair:		Print:		Date:
Hon	ne Department Chair:	me Dy Dr	Print:Emi	ily Mower Provost	Date: 5/18/23

DEPARTMENTAL/CO	LLEGE USE ONLY
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Print:

Print:

Print:

Date:

Date:

Date:

Cross-Listed Department Chair:

Cross-Listed Department Chair:

Cross-Listed Department Chair:

Current:	Requested:
Course Description	Course Description
In-depth study of compiler backend design for	In-depth study of compiler backend design for
high-performance architectures. Topics include	high-performance architectures. Topics include
control-flow and data-flow analysis, optimization,	control-flow and data-flow analysis, optimization,
instruction scheduling, register allocation. Advanced	instruction scheduling, register allocation. Advanced
topics include memory hierarchy management,	topics include memory hierarchy management,
instruction-level parallelism, predicated and speculative	instruction-level parallelism, predicated and speculative
execution. The class focus is processor-specific	execution. The class focus is processor-specific
compilation techniques, thus familiarity with both computer	compilation techniques, thus familiarity with both computer
architecture and compilers is recommended.	architecture and compilers is recommended.
Class Length	Class Length
Full term	Full term
Contact hours (lecture):	Contact hours (lecture):
4	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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested New Course Modification of Existing Course Deletion of Existing Course 	Date of Submission: 2023-05-05 Effective Term: Fall 2024
$[\mathbf{V}]$	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING			
Ŋ	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 584		Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 584				
	\Box 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 ti	itle)		Course Title (full ti	Course Title (full title)		
	Advanced D	atabase Systems		Advanced Database Systems			
	Abbreviated Title (20 char)		Abbreviated Title (20 char)				
	Adv Dbase Sys			Adv Dbase Sys			
_	Course Description	n (Please limit to 50	words and attach se	eparate sheet if necessary)			
	Advanced to	ppics and research is	ssues in database m	anagement systems. Distributed databases, advanced			
	query optimization	n, query processing	, transaction process	sing, data models an	d architectures. Dat	ta management	
	for emerging appli	ication areas, includ	ling bioinformatics, t	he internet, OLAP, a	nd data mining. A s	ubstantial course	
	project allows in-d	lepth exploration of	topics of interest.				
	Full Term Credit Hours		Half Term Credit Hours				
	Undergraduate Mi	in: 4 Graduat	e Min: 4	Undergraduate Mi	n: Graduat	e Min:	
	Undergraduate Ma	ax: 4 Graduat	e Max: 4	Undergraduate Ma	ax: Graduat	e Max:	
	Course Credit Type	9					
	Undergraduate Student, Rackham Graduate Student						
	Repeatability			_			
	☐ Course is Rep	eatable for Credit		Course is Y graded			
	Maximum number of repeatable credits:			\square Can be taken more than once in the same term			



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				201	
Subj	ject: 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 Instructor Co No Consent 	Drop Consent Consent	t Consent onsent	
	CURRENT LISTING		REQUESTED LISTING		
	Advisory Prerequisite (254 char) EECS 484 or permission of in	structor	Advisory Prerequisite (254 char) EECS 484 or permission of instru	uctor	
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)		
	Minimum grade requirement:		Minimum grade requirement:		
	Credit Exclusions		Credit Exclusions		
	Course Components	Graded Compone	nt Terms Typically C)ffered	
	☑ Lecture		☑ Fall		
			🗹 Winter		
			Spring		
			□ Summer		
	Discussion Independent Study		Spring/Summ	er	
Cog	nizant Faculty Member Name: Barz	an Mozafari	Cognizant Faculty Member Title:		
SIG	NATURES ARE REQUIRED FROM AL	L DEPARTMENTS INVOLV	/ED (Please Print AND Sign Name)		
Con	tact Person: Punam Vyas	Email: vyas@umich.ec	lu Phone: 647-1754		
CoE Com	Curriculum nmittee Representative:	Dinflour	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:	
Cros	ss-Listed Department Chair:		Print:	Date:	
Cros	Cross-Listed Department Chair: Print: Date:				

Current:	Requested:
Course Description	Course Description
Advanced topics and research issues in database	Advanced topics and research issues in database
management systems. Distributed databases, advanced	management systems. Distributed databases, advanced
query optimization, query processing, transaction	query optimization, query processing, transaction
processing, data models and architectures. Data	processing, data models and architectures. Data
management for emerging application areas, including	management for emerging application areas, including
bioinformatics, the internet, OLAP, and data mining. A	bioinformatics, the internet, OLAP, and data mining. A
substantial course project allows in-depth exploration of	substantial course project allows in-depth exploration of
topics of interest.	topics of interest.
Class Length	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
4	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:



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

	CURRENT LISTING			REQUESTED LISTING		
Ŋ	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		Course is C	Cross-Listed with Ot	her Departments	
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	itle)		Course Title (full ti	itle)	
	Parallel Com	nputing		Parallel Computing		
	Abbreviated Title (20 char)		Abbreviated Title (20 char)			
	Parallel Computing			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					nd balancing, I systems such as rse includes a
	Full Term Credit H	ours		Half Term Credit H	lours	
	Full Territ Credit Hours		Hadargraduato Min: Graduato Min:		te Min [.]	
	Undergraduate M	ax: 4 Graduat	te Max: 4	Undergraduate Ma	ax: Gradua	te Max:
	Course Credit Type Undergraduate Student, Rackham Graduate Student					
	Repeatability					
	🗆 Course is Rep	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits:		\square Can be taken more than once in the same term			



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				204	
Sub	ject: 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	Drop Consent Consent	Consent onsent	
	CURRENT LISTING		REQUESTED LISTING		
	Advisory Prerequisite (254 char)		Advisory Prerequisite (254 char)		
	EECS 281 and grad standing		EECS 281 and grad standing		
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)		
	Minimum grade requirement:		Minimum grade requirement:		
	Credit Exclusions		Credit Exclusions		
	Course Components	Graded Componer	it Terms Typically O	fforod	
	☑ Lecture ☑				
	□ Seminar □		∠ Winter		
	□ Recitation □		\Box Spring		
	🗹 Lab		□ Sµmmer		
	Discussion		\Box Spring/Summe	er	
Independent Study					
Cog	nizant Faculty Member Name: Que	ntin Stout	Cognizant Faculty Member Title:		
SIG	NATURES ARE REQUIRED FROM AL	L DEPARTMENTS INVOLV	ED (Please Print AND Sign Name)		
Con	tact Person: Punam Vyas	Email:vyas@umich.edu	Phone:647-1754		
CoE Con	Curriculum nmittee Representative:	antan	Print:Amir Kamil	Date: 5/17/23	
CoE Curriculum Committee Chair:			Print:	Date:	
Hon	ne Department Chair: 🧠	2 m Def Dr	Print:Emily Mower Provost	Date: 5/18/23	
Cros	ss-Listed Department Chair:		Print:	Date:	
Cros	ss-Listed Department Chair:		Print:	Date:	
Cros	Cross-Listed Department Chair: Print: Date:				

Current:	Requested:
<u>Course Description</u>	<u>Course Description</u>
The development of programs for parallel computers.	The development of programs for parallel computers.
Basic concepts such as speedup, load balancing, latency,	Basic concepts such as speedup, load balancing, latency,
system taxonomies. Design of algorithms for idealized	system taxonomies. Design of algorithms for idealized
models. Programming on parallel systems such as shared	models. Programming on parallel systems such as shared
or distributed memory machines, networks. Grid	or distributed memory machines, networks. Grid
computing. Performance analysis. Course includes a	computing. Performance analysis. Course includes a
substantial term project.	substantial term project.
<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	3
Contact hours (recitation)	Contact hours (recitation)
<u>Contact hours (lab)</u>	<u>Contact hours (lab)</u>
1	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:



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	
V	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:	

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
N	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		🗆 Course is C	Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	itle)		Course Title (full title)		
	Computer a	nd Network Securit	У	Computer a	nd Network Security	Y
	Abbreviated Title ((20 char)		Abbreviated Title (20 char)		
	Comp Netw	k Security		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		Half Term Credit Hours			
	Undergraduate Mi	in: 4 Graduat	e Min: 4	Undergraduate Mi	in: Graduat	e Min:
	Undergraduate Ma	ax: 4 Graduat	e Max: 4	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type Undergraduate Student, Rackham Graduate Student					
	Repeatability					
	🗆 Course is Rep	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits:		\square Can be taken more than once in the same term			

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				207
Sub	ject: Elec Engin & Computer Sci	Catalog: 588		
	Grading Basis ✓ Graded (A – E) □ Credit/No Credit □ Satisfactory/Unsatisfactory □ Pass/Fail □ Business Administration	Add Consent	Consent nsent	Drop Consent Department Consent Instructor Consent
	Grading Not for Credit Not for Degree Credit Degree Credit Only 	No Consent		No Consent
CURRENT LISTING			REQUESTED LIST	ING
	Advisory Prerequisite (254 char) EECS 482 or 489; or graduate sta	anding.	Advisory Prerequ EECS 482 or 48	uisite (254 char) 89; or graduate standing.
	Enforced Prerequisite (254 char)		Enforced Prerequ	uisite (254 char)

	Minimum grade requirement: Credit Exclusions		Minimum grade requirement: Credit Exclusions
	Course Components Image: Course Components Image: Course Course Image: Course	Graded Componen	nt 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:

Current: **Requested: Course Description 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 Class Length Full term

Contact hours (lecture): 4

Contact hours (recitation)

Contact hours (lab)

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 Contact hours (lecture): 4 Contact hours (recitation)

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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested New Course Modification of Existing Course Deletion of Existing Course 	Date of Submission: 2023-05-17 Effective Term: Fall 2024
V	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
ß	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 589		Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 589			
	\Box Course is Cross-Listed with Other Departments		🗆 Course is C	ross-Listed with Oth	ner Departments	
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
			-			
	Course Title (full ti	itle)		Course Title (full ti	tlo)	
	Advanced Co	omputer Networks		Advanced Computer Networks		
	Abbreviated Title (20 char)		Abbreviated Title (20 char)			
	Adv Comp Net		Adv Comp Net			
	Course Description	Course Description (Please limit to 50 words and attach separate sheet if necessary)				
	Advanced to	ppics and research is	ssues in computer n	etworks. Topics include routing protocols, multicast		
	delivery, congestion control, quality of service support, ne			twork security, prici	ng and accounting a	and wireless
	access and mobile networking. Emphasis is placed on per			formance trade-offs	in protocol and arc	hitecture designs.
	Readings assigned from research publications. A course project allows in-depth exploration of topics of interest.			pics of interest.		
	Full Term Credit Hours		Half Term Credit Hours			
	Undergraduate Mi	in: 4 Graduat	e Min: 4	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate Ma	ax: 4 Graduat	e Max: 4	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type	2				
	Undergraduate	Student, Rackham G	Graduate Student			
	Repeatability					
	🗆 Course is Rep	eatable for Credit		Course is Y grac	led	
	Maximum number of repeatable credits:		🗌 Can be taken m	ore than once in th	e same term	

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				210
Sub	iect: 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	Drop Consent Consent	Consent nsent
	CURRENT LISTING		REQUESTED LISTING	
	Advisory Prerequisite (254 char) EECS 489		Advisory Prerequisite (254 char) EECS 489	
_	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)	
 Minimum grade requirement: 			Minimum grade requirement:	
	Credit Exclusions		Credit Exclusions	
	Course Components Course Components Course Components Course Components Course Components Course Course Course Course	Graded Componer	nt Terms Typically Of ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summe	fered r
Cog	nizant Faculty Member Name: Z. M	orley 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				54
CoE Con	Curriculum mittee Representative:	and and	Print:Amir Kamil	Date: 5/17/23
CoE	Curriculum Committee Chair:		Print:	Date:
Hor	ne Department Chair: 🧷	- And	Print:Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair:			Print:	Date:

Cross-Listed Department Chair:

DEPARTMENTAL/COLLEGE USE ONLY

Print:

Print:

Date:

Date:

Current:	Requested:
<u>Course Description</u>	<u>Course Description</u>
Advanced topics and research issues in computer	Advanced topics and research issues in computer
networks. Topics include routing protocols, multicast	networks. Topics include routing protocols, multicast
delivery, congestion control, quality of service support,	delivery, congestion control, quality of service support,
network security, pricing and accounting and wireless	network security, pricing and accounting and wireless
access and mobile networking. Emphasis is placed on	access and mobile networking. Emphasis is placed on
performance trade-offs in protocol and architecture	performance trade-offs in protocol and architecture
designs. Readings assigned from research publications. A	designs. Readings assigned from research publications. A
course project allows in-depth exploration of topics of	course project allows in-depth exploration of topics of
interest.	interest.
<u>Class Length</u>	Class Length
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	3
<u>Contact hours (recitation)</u>	<u>Contact hours (recitation)</u>
1	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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	Action Requested				
	New Course	Date of Submission: 2023-05-08			
	Modification of Existing	Effective Term: Fall 2024			
Course					
	Deletion of Existing Course				
\mathbf{K}	Course Offered	RO USE ONLY			
	☐ One term only	Date Received:			
		Date Completed:			
		Completed By:			

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING			
	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 590		Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 590				
	\Box Course is Cross-Listed with Other Departments		🗆 Course is C	Course is Cross-Listed with Other Departments			
	Department	Subject	Catalog Number	Department	Subject	Catalog Number	
	Course Title (full title)		Course Title (full title)				
	Advanced Programming Languages		Advanced Programming Languages				
	Abbreviated Title (20 char)		Abbreviated Title (20 char)				
	Adv Prog Lang		Adv Prog Lang				
	Course Description	Course Description (Please limit to 50 words and attach separate sheet if necessary)					
	Fundamenta	al concepts in progr	amming languages a	s well as recent top	ics and trends in PL	research. Topics	
	include semantics, type systems, program verification usi		ng theorem provers,	software model ch	ecking, and		
	program analysis. Course focuses on applying PL concept			s to improve softwa	re reliability. Course	e includes	
	semester long indi	ividual research pro	ject.				
_	Full Term Credit H	ours		Half Term Credit Hours			
	Undergraduate Mi	in: 4 Graduat	e Min: 4	Undergraduate Mi	in: Graduat	e Min:	
	Undergraduate Ma	ax: 4 Graduat	e Max: 4	Undergraduate Ma	ax: Graduat	e Max:	
	Course Credit Type	e					
	Undergraduate	Student, Rackham (Graduate Student				
	Repeatability						
	🗆 Course is Rep	eatable for Credit		Course is Y grad	□ Course is Y graded		
	Maximum number of repeatable credits:		\square Can be taken more than once in the same term				

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			213		
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 C □ Instructor Cor ☑ No Consent	Drop Consent Consent	onsent sent		
CURRENT LISTING		REQUESTED LISTING			
Advisory Prerequisite (254 char) EECS 281 or equivalent		Advisory Prerequisite (254 char) EECS 281 or equivalent			
Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)			
Minimum grade requirement:		Minimum grade requirement:			
Credit Exclusions		Credit Exclusions			
Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componen	t Terms Typically Offe ✓ Fall ✓ Winter □ Spring □ Summer □ Spring/Summer	ered		
Cognizant Faculty Member Name: Westley Weimer Cognizant Faculty Member Title:					
SIGNATURES ARE REQUIRED FROM AL	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:	Dinfland	Print: Amir Kamil	Date: 5/17/23		
CoE Curriculum Committee Chair:		Print:	Date:		
Home Department Chair:	5A	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:		
Contact Person: Punam VyasEmail: vyas@umich.eduPhone: 734-647-1754CoE Curriculum Committee Representative:Omder OPrint: Amir KamilDate: 5/17CoE Curriculum Committee Chair:Print:Print:Date:Home Department Chair:Image: March					

Current: **Requested: Course Description Course Description** Fundamental concepts in programming languages as well Fundamental concepts in programming languages as well as recent topics and trends in PL research. Topics include as recent topics and trends in PL research. Topics include semantics, type systems, program verification using semantics, type systems, program verification using theorem provers, software model checking, and program theorem provers, software model checking, and program analysis. Course focuses on applying PL concepts to analysis. Course focuses on applying PL concepts to improve software reliability. Course includes semester improve software reliability. Course includes semester long individual research project. long individual research project. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 3 3 Contact hours (recitation) Contact hours (recitation) 1 1 Contact hours (lab) Contact hours (lab)

214

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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on 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

	CURRENT LISTING	i		REQUESTED LISTING					
	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 591			Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 591					
	\Box 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)					
	Distributed Systems			Distributed Systems					
	Abbreviated Title (20 char)			Abbreviated Title (20 char)					
	Dist Sys			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. Programn	models. Programming paradigms including group communication, RPC, distributed shared memory, and distributed shared memory.							
	objects. Operating	bjects. Operating system kernel support; distributed system services including replication, caching, file system							
	management, nan	anagement, naming, clock synchronization and multicast communication.							
	Full ferm Credit Hours			Hadergraduate Min:					
	Undergraduate Mi	in: Graduat av: Graduat	e Max: 4	Undergraduate Mi	n: Graduat	e Max:			
	Course Credit Tune			Undergraduate Ma					
	Rackham Gradu	z ate Student							
	Reneatability								
	\Box Course is Repeatable for Credit			Course is Y graded					
	Maximum number of repeatable credits:			□ Can be taken more than once in the same term					

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				216		
Sub	ect: 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 C □ Instructor Cor ☑ No Consent	Drop Consent Consent	Orop Consent ☐ Department Consent ☐ Instructor Consent ☑ No Consent		
	CURRENT LISTING		REQUESTED LISTING			
	Advisory Prerequisite (254 char)		Advisory Prerequisite (254 char)			
	ELCS 482 and graduate stand Enforced Prerequisite (254 char)	ang.	EECS 482 and graduate standing.			
	Minimum grade requirement:		Minimum grade requirement:			
	Credit Exclusions Students who have previously enrolled in 491		Creail Exclusions Students who have previously eprolled in 191			
	cannot get credit for 591.		cannot get credit for 591.			
	Course Components	Graded Componen	t Terms Typically O	ffered		
	Lecture		Z Fall			
	Seminar Resitation		🗹 Winter			
v			□ □ □ Spring			
	Discussion		□ □ Summer			
	Independent Study		Spring/Summer			
Cog	nizant Faculty Member Name: Mane	os Kapritsos	Cognizant Faculty Member Title:			
SIGI	NATURES ARE REQUIRED FROM ALL	DEPARTMENTS INVOLV	ED (Please Print AND Sign Name)			
Con	tact Person: Punam Vyas	Email: vyas@umich.ed	Phone: 647-1754			
CoE	Curriculum	# ===()				
Con	mittee Representative:	ceen	Print: Amir Kamil	Date:5/24/23		
CoE	Curriculum Committee Chair:		Print:	Date:		
Hon	ne Department Chair: 2004	D	Print: Emily Mower Provost	Date:5/24/23		
Cros	s-Listed Department Chair:		Print:	Date:		
Cros	ss-Listed Department Chair:		Print:	Date:		
Cros	s-Listed Department Chair:		Print:	Date:		
Current:

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

Contact hours (lecture): 3

Contact hours (recitation) 1

Contact hours (lab)

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.

Requested:

Class Length Full term

<u>Contact hours (lecture):</u> 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:



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	
Ŋ	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:	

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING			
N	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 592			Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 592			
	🗌 Course is Cr	oss-Listed with Oth	er Departments	🗆 Course is C	ross-Listed with Otl	ner Departments	
	Department	Subject	Catalog Number	Department	Subject	Catalog Number	
	Course Title (full ti	tle)		Course Title (full ti	Course Title (full title)		
	Foundations	of Artificial Intellig	ence	Foundations of Artificial Intelligence			
	Abbreviated Title (20 char)			Abbreviated Title (20 char)			
	Al Foundatio	ons		AI Foundations			
	Course Description	n (Please limit to 50	words and attach se	eparate sheet if nece	essary)		
	An advanced	d introduction to AI	emphasizing its				
	theoretical underp	innings. Topics incl	ude search, logic, kn	owledge representa	tion, reasoning plar	nning, decision	
	making under unc	ertainty, and machi	ne learning.				
	Full Term Credit Ho	ours		Half Term Credit Hours			
	Undergraduate Mi	n: Graduat	e Min: 4	Undergraduate Mi	n: Graduat	e Min:	
	Undergraduate Ma	ax: Graduat	e Max: 4	Undergraduate Ma	ax: Graduat	e Max:	
	Course Credit Type						
	Rackham Gradu	ate Student, Non-Ra	ackham Graduate St	udent			
	Repeatability						
	🗌 Course is Rep	eatable for Credit		Course is Y graded			
	Maximum number of repeatable credits:			🗌 Can be taken m	ore than once in th	e same term	

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1210 LSA Building

500 S. State Street

Ann Arbor, MI 48109-1382

Phone: 734.763.2113

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				219
Sub	ject: 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 Instructor Co No Consent	Consent nsent	Drop Consent Department Consent Instructor Consent No Consent
	CURRENT LISTING		REQUESTED L	ISTING
	Advisory Prerequisite (254 char)		Advisory Prere	equisite (254 char)
	Enforced Prerequisite (254 char) Graduate Standing		Enforced Prer Graduate Sta	equisite (254 char) nding
	Minimum grade requirement:		Minimum grad	de requirement:
_	Credit Exclusions		Credit Exclusio	ons

Graded Component

 \mathbf{V}

 \square

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

Email: vyas@umich.edu

No credit to a student who has taken EECS 492.

🗹 Fall

Cognizant Faculty Member Title:

Winter

□ Spring

□ Summer

Phone: 647-1754

□ Spring/Summer

Terms Typically Offered

Course Components

☑ Lecture

□ Seminar

🗆 Lab

□ Recitation

☑ Discussion

Contact Person: Punam Vyas

□ Independent Study

Cognizant Faculty Member Name: Mithun Chakraborty

No credit to a student who has taken EECS 492.

DEPARTMENTAL/COLLEGE USE ONLY

CoE Curriculum Committee Representative:	Print: Amir Kamil	Date: 5/17/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: 2004	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:

Current:

Requested:

Course Description Course Description An advanced introduction to AI emphasizing its An advanced introduction to AI emphasizing its theoretical underpinnings. Topics include search, logic, theoretical underpinnings. Topics include search, logic, knowledge representation, reasoning planning, decision knowledge representation, reasoning planning, decision making under uncertainty, and machine learning. making under uncertainty, and machine learning. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 3 3 Contact hours (recitation) Contact hours (recitation) 1 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:



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	
V	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:	

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
Ŋ	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 593			Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 593		
	🗆 Course is Ci	ross-Listed with Oth	er Departments	🗆 Course is C	ross-Listed with Ot	her Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	itle)		Course Title (full title)		
	Human-Con	nputer Interaction		Human-Computer Interaction		
	Abbreviated Title (20 char)			Abbreviated Title (20 char)		
	HCI			НСІ		
	Course Description	Course Description (Please limit to 50 words and attach separate sheet if necessary)				
	Principles (e	e.g., human-centere	d systems design, us	ability, accessibility)	and methods(e.g.,	requirements
	gathering, function	nal prototyping, use	r study evaluation)	of technical Human-	ComputerInteraction	on (HCI) research.
	Survey of HCI rese	arch threads includ	ing Human-Al Intera	ction, Social Compu	ting, Behavior Mod	leling, Education
	Technologies. Gro	up assignments give	students exposure	to HCI research met	hods.	
	Full Term Credit Hours			Half Term Credit Hours		
	Undergraduate M	in: Graduat	e Min: 3	Undergraduate Mi	n: Gradua	te Min:
	Undergraduate Ma	ax: Graduat	e Max: 3	Undergraduate Ma	ax: Gradua	te Max:
	Course Credit Type	e				
	Rackham Gradu	ate Student, Non-Ra	ackham Graduate St	udent		
	Repeatability					
	🗆 Course is Rep	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits:			\Box Can be taken more than once in the same term		

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Sub	ject: 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 C □ Instructor Cor ☑ No Consent	Consent Isent	Drop Consent ☐ Department Co ☐ Instructor Cons ☑ No Consent	nsent ent	
	CURRENT LISTING		REQUESTED LISTI	NG		
	Advisory Prerequisite (254 char)		Advisory Prerequ	isite (254 char)		
	Enforced Prerequisite (254 char) Graduate standing Minimum grade requirement:		Enforced Prerequ Graduate sta Minimum grade r	isite (254 char) anding requirement:		
	Credit Exclusions		Credit Exclusions	•		
	Course Components	Graded Componer	t	Terms Typically Offe ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer	red	
Cog	nizant Faculty Member Name: Niko	la Banovic	Cognizant Faculty	Member Title:		
SIGI	NATURES ARE REQUIRED FROM AL	L DEPARTMENTS INVOLV	ED (Please Print A	ND Sign Name)		
Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754						
CoE Curriculum						

	and and		Date. 3/17/23
CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:	2morph	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:

Current:	Requested:
Course Description	Course Description
Principles (e.g., human-centered systems design,	Principles (e.g., human-centered systems design,
usability, accessibility) and methods(e.g., requirements	usability, accessibility) and methods(e.g., requirements
gathering, functional prototyping, user study evaluation) of	gathering, functional prototyping, user study evaluation) of
technical Human-ComputerInteraction (HCI) research.	technical Human-ComputerInteraction (HCI) research.
Survey of HCI research threads including Human-AI	Survey of HCI research threads including Human-AI
Interaction, Social Computing, Behavior Modeling,	Interaction, Social Computing, Behavior Modeling,
Education Technologies. Group assignments give students	Education Technologies. Group assignments give students
exposure to HCI research methods.	exposure to HCI research methods.
<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	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:

<u>Special resources of facilities required for this course:</u> n/a

Supporting statement:



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

	CURRENT LISTING			REQUESTED LISTING		
Ŋ	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 595			Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 595		
	🗹 Course is Cr	Course is Cross-Listed with Other Departments			ross-Listed with Oth	er 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 ti	tle)		Course Title (full title)		
	Abbreviated Title (20 char)		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 HoursUndergraduate Min: 3Graduate Min: 3Undergraduate Max: 3Graduate Max: 3		Half Term Credit HoursUndergraduate Min:Graduate Min:Undergraduate Max:Graduate Max:		e Min: e Max:	
	Course Credit Type Undergraduate Student, Rackham Graduate Student, Non-Rackham Graduate Student					
	Repeatability Course is Rep Maximum number	eatable for Credit r of repeatable cred	its:	Course is Y graded Can be taken more than once in the same term		

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				225
Subj	ject: 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 Instructor Co No Consent	Consent nsent	Drop Consent Department Consent Instructor Consent No Consent
	CURRENT LISTING			ISTING
	Advisory Prerequisite (254 char) Senior standing		Advisory Prere Senior sta	equisite (254 char) anding
	Enforced Prerequisite (254 char)		Enforced Prere	equisite (254 char)
	Minimum grade requirement:		Minimum grad	de requirement:
	Credit Exclusions		Credit Exclusio	ons
	Course Components Course Components Cecture Seminar Recitation Lab Discussion Independent Study	Graded Componen	nt	Terms Typically Offered Fall Winter Spring Summer Spring/Summer

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

Contact Person: Punam Vyas	
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Cognizant Faculty Member Name: Joyce Chai

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\sim	·mal	
(A	al au /	

Email: vyas@umich.edu

Phone: 647-1754

Cognizant Faculty Member Title:

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:
<u>Course Description</u>	<u>Course Description</u>
Linguistic fundamentals of natural language processing	Linguistic fundamentals of natural language processing
(NLP), part of speech tagging, hidden Markov models,	(NLP), part of speech tagging, hidden Markov models,
syntax and parsing, lexical semantics, compositional	syntax and parsing, lexical semantics, compositional
semantics, word sense disambiguation, machine	semantics, word sense disambiguation, machine
translation. Additional topics such as sentiment analysis,	translation. Additional topics such as sentiment analysis,
text generation, and deep learning for NLP.	text generation, and deep learning for NLP.
<u>Class Length</u>	Class Length
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	3

Contact hours (recitation)

Contact hours (lab)

Contact hours (lab)

Contact hours (recitation)

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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on 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

	CURRENT LISTING			REQUESTED LISTING		
N	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		🗆 Course is C	Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full title)		Course Title (full title)			
	Special Topics		Special Topics			
	Abbreviated Title (20 char)		Abbreviated Title (20 char)			
	Special Topics			Special Topics		
Ŋ	Course Description (Please limit to 50 words and attach so Topics of current interest in computer science and o more than once for credit.		eparate sheet if nece engineering. Lecture	essary) s, seminar or labora	atory. Can be taken	
	Full Term Credit Hours		Half Term Credit Hours			
	Undergraduate Mi	in: 1 Graduat	e Min: 1	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate Ma	ax: 4 Graduat	e Max: 4	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type					
	Undergraduate Student, Rackham Graduate Student					
	Repeatability					
	🗹 Course is Rep	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits: 999		Can be taken more than once in the same term			

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			228		
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 C Instructor Cor No Consent	Drop Consent Consent	t Consent onsent		
CURRENT LISTING		REQUESTED LISTING			
Advisory Prerequisite (254 char) Permission of instructor or c	ounselor	Advisory Prerequisite (254 char) Permission of instructor or court	nselor		
Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)			
Minimum grade requirement:		Minimum grade requirement:			
Credit Exclusions		Credit Exclusions			
Course Components Course Components Cure Seminar CRecitation Lab Discussion Independent Study	Graded Componer	ot Terms Typically C ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summ)ffered er		
Cognizant Faculty Member Name: Emi	Cognizant Faculty Member Name: Emily Mower Provost Cognizant Faculty Member Title:				
SIGNATURES ARE REQUIRED FROM AL Contact Person:Punam Vyas	L DEPARTMENTS INVOLV Email: vyas@umich.ed	ED (Please Print AND Sign Name) u Phone: 647-1754			
CoE Curriculum Committee Representative:	infand	Print: Amir Kamil	Date:6/12/23		
CoE Curriculum Committee Chair:		Print:	Date:		
Home Department Chair:	Stan-	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 **Course Description** Topics of current interest in electrical engineering and Topics of current interest in computer science and engineering. Lectures, seminar or laboratory. Can be computer science. Lectures, seminar or laboratory. Can be taken more than once for credit. taken more than once for credit. Class Length Class Length Full term 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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	Action Requested				
	New Course	Date of Submission: 2023-05-16 Effective Term: Fall 2024			
	Modification of Existing				
Course					
	Deletion of Existing Course				
Ŋ	Course Offered	RO USE ONLY			
	✓ Indefinitely	Date Received:			
		Date Completed:			
		Completed By:			

CURRENT LISTING

	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 Cr	ross-Listed with Oth	er Departments	🗆 Course is C	ross-Listed with Ot	her Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full title)		Course Title (full title)			
	Directed Study		Directed Study			
	Abbreviated Title (20 char)		Abbreviated Title (20 char)			
	Directed Study		Directed Study			
	Course Description	n (Please limit to 50	words and attach se	eparate sheet if nece	essary)	
	Individual st	udy of selected adv	anced topics in com	puter science and engineering. May include experimental		
	work or reading. Primarily for graduate students. To be gr		aded on satisfactory	/unsatisfactory bas	is ONLY.	
	Full Term Credit Hours		Half Term Credit Hours			
	Undergraduate Mi	in: 1 Graduat	e Min: 1	Undergraduate Mi	n: Gradua	te Min:
	Undergraduate Ma	ax: 4 Graduat	e Max: 4	Undergraduate Ma	ax: Gradua	te Max:
	Course Credit Type	9				
	Undergraduate Student, Rackham Graduate Student					
	Repeatability					
	🗹 Course is Rep	eatable for Credit		Course is Y graded		
	Maximum number	r of repeatable cred	its: 999	🗌 Can be taken n	nore than once in t	he same term

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				231
Subj	ect: 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 (Instructor Co No Consent	Drop Consent Consent	t nent Consent or Consent ent
	CURRENT LISTING		REQUESTED LISTING	
	Advisory Prerequisite (254 char) Prior arrangement with instr	uctor	Advisory Prerequisite (254 char) Prior arrangement with ins	structor
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)	
	Minimum grade requirement:		Minimum grade requirement:	
	Credit Exclusions		Credit Exclusions	
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study 	Graded Componer	nt Terms Typical ☑ Fall ☑ Winter ☑ Spring ☑ Summer ☑ Spring/Su	lly Offered mmer
Cog	nizant Faculty Member Name: Emil	y Mower Provost	Cognizant Faculty Member Title:	
SIG	NATURES ARE REQUIRED FROM AL	L DEPARTMENTS INVOLV	ED (Please Print AND Sign Name)	
Con	tact Person:Punam Vyas	Email:vyas@umich.edu	u Phone:734-647	2-1754
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
Cros	s-Listed Department Chair:		Print:	Date:
Cros	s-Listed Department Chair:		Print:	Date:
Cros	s-Listed Department Chair:		Print:	Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current: **Requested: Course Description Course Description** Individual study of selected advanced topics in electrical Individual study of selected advanced topics in computer engineering and computer science. May include science and engineering. May include experimental work experimental work or reading. Primarily for graduate or reading. Primarily for graduate students. To be graded students. To be graded on satisfactory/unsatisfactory basis on satisfactory/unsatisfactory basis ONLY. ONLY. Class Length Class Length Full term 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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Action Requested				
	☐ New Course ☑ Modification of Existing	Date of Submission: 2023-05-10		
	Course	Effective Term: Fall 2024		
	Deletion of Existing Course			
Ŋ	Course Offered	RO USE ONLY		
	✓ Indefinitely	Date Received:		
		Date Completed:		
		Completed By:		

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
ß	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 601			Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 601		
	🗆 Course is Cr	ross-Listed with Oth	er Departments	Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	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)			Abbreviated Title (20 char)		
	Intro CSE Gr	ad Res		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				ide range of ss, time career paths, etc.	
	Full Term Credit Hours			Half Term Credit Hours		
	Undergraduate Mi	in: Graduat	e Min: 1	Undergraduate Mi	n: Graduate	e Min:
	Undergraduate Ma	ax: Graduat	e Max: 1	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type Rackham Graduate Student, Non-Rackham Graduate Stu			udent		
	Repeatability					
	Course is Repeatable for Credit			Course is Y graded		
	Maximum number of repeatable credits:			\Box Can be taken more than once in the same term		



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Sub	ject: Elec Engin & Computer Sci	Catalog: 601	234	
	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 O Instructor Con No Consent 	Drop Consent Consent	
	CURRENT LISTING	REQUESTED LISTING		
	Advisory Prerequisite (254 char)		Advisory Prerequisite (254 char)	
	Enforced Prerequisite (254 char) Graduate Standing Minimum grade requirement: Credit Exclusions	Enforced Prerequisite (254 char) Graduate Standing Minimum grade requirement: Credit Exclusions		
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componer	ent Terms Typically Offered Fall Winter Spring Summer Spring/Summer	
Cognizant Faculty Member Name: Alanson Sample Cognizant Faculty Member Title:				
Con	tact Person: Punam Vyas	Email: vyas@umich.ed	du 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
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Current:	Requested:
<u>Course Description</u>	<u>Course Description</u>
An introduction for incoming Ph.D. students and	An introduction for incoming Ph.D. students and
research-focused Master's students to a wide range of	research-focused Master's students to a wide range of
topics critical to academic research. Rotating speakers will	topics critical to academic research. Rotating speakers will
give perspective on the research process, time	give perspective on the research process, time
management, publishing in CS, managing the highs and	management, publishing in CS, managing the highs and
lows of grad school, advisor interactions, career paths,	lows of grad school, advisor interactions, career paths,
etc.	etc.
<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
1	1

Contact hours (recitation)

Contact hours (lab)

Contact hours (lab)

Contact hours (recitation)

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:



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

	CURRENT LISTING			REQUESTED LISTING			
ß	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 602			Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 602			
	🗆 Course is Cr	ross-Listed with Oth	er Departments	□ Course is Cross-Listed with Other Departments			
	Department	Subject	Catalog Number	Department	Subject	Catalog Number	
	Course Title (full title)			Course Title (full title)			
		(20 char)		Abbroviated Title (20 shar)			
		(20 char) arnThoory		Reinforcel earnTheory			
		a (Plaaca limit to EO	words and attach so	enarate sheet if necessary)			
	Basic theori	es and principles of	reinforcement learn	ming and model-based and model-free reinforcement			
	learning algorithm	learning algorithms. Tonics: Value iteration, policy iteration, O-learning, SARSA, policy-gradient, variance reduction					
	linear and nonline	ar function approxi	mation, deep reinfor	cement learning, ex	ploration-exploitati	on. convergence	
	analysis, regret an	alysis.				,	
	Full Term Credit H	ours		Half Term Credit Hours			
	Undergraduate Mi	in: Graduat	e Min: 3	Undergraduate Mi	n: Graduat	e Min:	
	Undergraduate Ma	ax: Graduat	e Max: 3	Undergraduate Ma	ax: Graduat	e Max:	
	Course Credit Type	9					
	Rackham Gradu	Rackham Graduate Student, Non-Rackham Graduate Student					
	Repeatability						
	🗆 Course is Rep	eatable for Credit		Course is Y graded			
	Maximum number of repeatable credits:			\Box Can be taken more than once in the same term			

1210 LSA Building

236

500 S. State Street

Ann Arbor, MI 48109-1382

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				237	
Sub	ject: 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 (Instructor Co No Consent 	Drop Consent Consent	Consent nsent	
	CURRENT LISTING		REQUESTED LISTING		
	Advisory Prerequisite (254 char) EECS 501		Advisory Prerequisite (254 char) ECE 501		
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)		
	Minimum grade requirement:		Minimum grade requirement:		
	Credit Exclusions		Credit Exclusions		
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componer	nt Terms Typically Off ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer	ered	
Cog	nizant Faculty Member Name: Heat	th Hofmann	Cognizant Faculty Member Title:		
SIG	NATURES ARE REQUIRED FROM AL tact Person: Punam Vyas	L DEPARTMENTS INVOLV Email:vyas@umich.edu	ED (Please Print AND Sign Name)		
CoE Curriculum Committee Representative: Print: Achilleas Anastasopoulos Date:7/11/2					
CoE Curriculum Committee Chair:			Print:	Date:	
Home Department Chair: Heart Heman			Print: Heath Hofmann	Date:7/11/23	
Cro	ss-Listed Department Chair:		Print:	Date:	
Cross-Listed Department Chair:			Print:	Date:	

Cross-Listed Department Chair:

DEPARTMENTAL/COLLEGE USE ONLY

Print:

Date:

Current:	Requested:
Course Description	<u>Course Description</u>
Basic theories and principles of reinforcement learning,	Basic theories and principles of reinforcement learning,
and model-based and model-free reinforcement learning	and model-based and model-free reinforcement learning
algorithms. Topics: Value iteration, policy iteration,	algorithms. Topics: Value iteration, policy iteration,
Q-learning, SARSA, policy-gradient, variance reduction,	Q-learning, SARSA, policy-gradient, variance reduction,
linear and nonlinear function approximation, deep	linear and nonlinear function approximation, deep
reinforcement learning, exploration-exploitation,	reinforcement learning, exploration-exploitation,
convergence analysis, regret analysis.	convergence analysis, regret analysis.
<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	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:



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

	CURRENT LISTING			REQUESTED LISTING		
Ŋ	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 C	ross-Listed with Oth	ner Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
_	Course Title (full ti	itle)		Course Title (full ti	tle)	
	Data Science and Machine Learning Design			Data Scien	ce and Machine Lea	rning Design
	Laboratory			Laboratory		
	Abbreviated Title (20 char)			Abbreviated Title (20 char)		
	DS and ML Des Lab DS and ML Des Lab					
	Course Description (Please limit to 50 words and attach separate sheet if necessary)					
	I his course uses a sequence of hands-on projects to bring into sharper focus the following concepts in the					
	data-to-decision cycle:					
	1. now smart (or b	ad) data can positiv	ely (or negatively) a	meet decisions in the	e design and operat	lon of an
	2 how to acquire	II; such data, cloan an	d storo it via annron	riato pro procossing	and nost processin	a it for aiding
	z. now to acquire	Such uata, clean and	u store it via approp	nate pre-processing	and post-processin	g it for alung
	3 how to display	render deploy and	internret it in the co	ntext of a real or sin	nulated closed-loop	type cloud based
	engineering system	m: and finally.				type cloud bused
	4. how to commun	nicate the shortcom	ings and vulnerabilit	ties of such systems,	including plug-and	-play systems
	using pre-trained	off-the-shelf deep le	earning models, whe	en integrated into a d	decision-making sys	tem.
	5. conceptualization and execution of an open-ended, reproducible cloud-based design project					
	Full Term Credit Hours			Half Term Credit H	ours	
	Undergraduate Mi	in: Graduat	e Min: 4	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate Ma	ax: Graduat	e Max: 4	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type	e eta Studant Nan Pr	ackham Graduata St	udopt		
				uuent		
	Repeatability					

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Sub	ject: 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)	Advisory Prerequisite (254 char)				
	EECS 505 or 551 or graduate equivalent	ECE 505 or 551 or graduate equivalent				
	Enforced Prerequisite (254 char)	Enforced Prerequisite (254 char)				
	Credit Evolucione	Cradit Evolusions				
	Course ComponentsGraded ComponentsImage: LectureImage: LectureImage: SeminarImage: LectureImage: RecitationImage: LectureImage: LabImage: LectureImage: DiscussionImage: LectureImage: Independent StudyImage: Lecture	nt Terms Typically Offer	red			
Cog	Cognizant Faculty Member Name: Rajesh Nadakuditi Cognizant Faculty Member Title:					
SIG	NATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLU	/ED (Please Print AND Sign Name)				
Con	Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754					
CoE Com	Curriculum amittee Representative:	Print: Achilleas Anastasopoulos	Date:7/11/23			
CoE	Curriculum Committee Chair:	Print:	Date:			
Hom	Home Department Chair: Heath Hofmann Date:7/11/23					
Cros	Cross-Listed Department Chair: Print: Date:					
Cros	ss-Listed Department Chair:	Print:	Date:			
Cros	s-Listed Department Chair:	Print:	Date:			

DEPARTMENTAL/COLLEGE USE ONLY

Current:

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

<u>Class Length</u> Full term

Contact hours (lecture): 3

Contact hours (recitation)

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:

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

Class Length Full term

Contact hours (lecture):

Contact hours (recitation)

Contact hours (lab)



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on 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

	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			🗆 Course is C	ross-Listed with C	Other Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	itle)		Course Title (full ti	tle)	
	Electronic a	nd Optical Propertie	es of	Electronic and Optical Properties of		
	Semiconductors		Semiconductors			
	Abbreviated Title (20 char)			Abbreviated Title (20 char)		
	Elect Opt Semicon			Elect Opt Semicon		
_	Course Description	n (Please limit to 50	words and attach se	eparate sheet if nece	essary)	
	The course of	discusses in detail th	ne theory behind im	portant		6 J.J.
	semiconductor ba	sed experiments su	ch as Hall effect and	Hall mobility measu	irement; velocity-	field measurement;
	Protoiuminescent	e; gain; pump-prob	e studies; pressure a	and strain depender	theory: Monto Co	/ Will cover: rlo mothods for high
	field transport: ex	citons, optical absor	ntion, luminescence	and gain.	theory, wonte ca	no methous for high
	Full Term Credit H	ours		Half Term Credit H	ours	
	Undergraduate Mi	in: Graduat	e Min: 4	Undergraduate Mi	n: Gradu	ate Min:
	Undergraduate Ma	ax: Graduat	e Max: 4	Undergraduate Ma	ax: Gradu	ate Max:
	Course Credit Type Rackham Gradu	e ate Student				
	Repeatability					
	Course is Rep	eatable for Credit		Course is Y grad	led	
	Maximum number	r of repeatable cred	its:	\Box Can be taken more than once in the same term		

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				244
Subj	ect: 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 C Instructor Con No Consent	Drop Consent Consent	Consent nsent
	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)		Enforced Prerequisite (254 char)	
	Minimum grade requirement:		Minimum grade requirement:	
	Credit Exclusions		Credit Exclusions	
	Course Components Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componer	t Terms Typically Of ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summe	fered r
Cog	nizant Faculty Member Name: Zetia	an Mi	Cognizant Faculty Member Title:	
Con	NATURES ARE REQUIRED FROM AL tact Person: Punam Vyas	L DEPARTMENTS INVOLV Email: vyas@umich.ed	ED (Please Print AND Sign Name) u Phone: 647-1754	
Cor	mittee Representative:	hesperty	Print: Achilleas Anastasopoulos	Date:7/11/23
CoE	Curriculum Committee Chair:		Print:	Date:
Hon	ne Department Chair: Head Hfman		Print: Heath Hofmann	Date:7/11/23
Cros	s-Listed Department Chair:		Print:	Date:
Cros	s-Listed Department Chair:		Print:	Date:
Cros	ss-Listed Department Chair:		Print:	Date:

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Current:

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.

Class Length Full term

Contact hours (lecture): 4

Contact hours (recitation)

Contact hours (lab)

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.

Requested:

Class Length

Full term

Contact hours (lecture): 4

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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested			
	New Course	Date of Submission: 2023-07-24		
	Modification of Existing	Effective Term: Fall 2024		
	Course			
	Deletion of Existing Course			
	Course Offerred	RO USE ONLY		
	Course Offered	Date Received:		
КI		Date Completed:		
		Completed By:		

CURRENT USTING

	CURRENT LISTING			REQUESTED LISTING		
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 631		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 631		Engineering	
	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 ti	tle)		Course Title (full title)		
	Electromagnetic Scattering		Electromagnetic Scattering			
[Abbreviated Title (20 char)			Abbreviated Title (20 char)		
	Em Scattering			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, creening wayes. Geometrical and physical theories of diffraction					by half plane der and sphere: ries of diffraction.
	Full Term Credit Ho	ours		Half Term Credit H	ours	
	Undergraduate Mi	in: Graduat	e Min: 3	Undergraduate Mi	n: Gradua	te Min:
	Undergraduate Ma	ax: Graduat	e Max: 3	Undergraduate Max: Graduate Max:		te Max:
П	Course Credit Type	2				
	Rackham Gradu	ate Student				
	Repeatability					
	Course is Repe	eatable for Credit	_	Course is Y graded		
	Maximum number of repeatable credits:			Can be taken more than once in the same term		

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				247	
Subj	ect: Elec Engin & Computer Sci Cat	alog: 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 C □ Instructor Con ☑ No Consent	Drop Co Consent De nsent Ins Z No	onsent partment Consent structor Consent Consent	
	CURRENT LISTING		REQUESTED LISTING		
V	Advisory Prerequisite (254 char) Graduate standing and EECS 530.		Advisory Prerequisite (254 Graduate standing and	char) d ECE 530	
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254	char)	
	Minimum grade requirement:		Minimum grade requirement:		
	Credit Exclusions		Credit Exclusions		
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componen	nt Terms T ☑ Fall ☑ Wint □ Sprir □ Sum □ Sprir	Fypically Offered er ng mer ng/Summer	
Cog	nizant Faculty Member Name: Heath Ho	fmann	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 Con	Curriculum mittee Representative:	r y	Print: Achilleas Anasta	sopoulos Date: 7/24/23	
CoE	Curriculum Committee Chair:		Print:	Date:	

Home Department Chair: Heath	Hofman	Print: Heath Hofmann	Date: 7/24/23
Cross-Listed Department Chair:	l	Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

DEPARTMENTAL	/COLLEGE	USE O	NLY
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Current: **Requested: Course Description** Course Description Boundary conditions, field representations. Low and high Boundary conditions, field representations. Low and high frequency scattering. Scattering by half plane frequency scattering. Scattering by half plane (Wiener-Hopf method) and wedge (Maliuzhinets method); (Wiener-Hopf method) and wedge (Maliuzhinets method); edge diffraction. Scattering by a cylinder and sphere: edge diffraction. Scattering by a cylinder and sphere: Watson transformation, Airy and Fock functions, creeping Watson transformation, Airy and Fock functions, creeping waves. Geometrical and physical theories of diffraction. waves. Geometrical and physical theories of diffraction. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 3 3 Contact hours (recitation) Contact hours (recitation)

Contact hours (lab)

248

Additional Info:

Contact hours (lab)

Submitted by: Home dept

Describe how this course fits with the degree requirements:

Special resources of facilities required for this course:

Supporting statement:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on 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

	CURRENT LISTING			REQUESTED LISTING		
ß	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 633		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 633		ngineering	
	Course is Cross-Listed with Other Departments			🗆 Course is C	ross-Listed with Oth	er Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	itle)		Course Title (full title)		
	Numerical Methods in Electromagnetics		agnetics	Numerical Methods in Electromagnetics		
	Abbreviated Title (20 char)		Abbreviated Title (20 char)			
	Num Meth I	E-M		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;				egral equations: D and 3-D ar arrays;	
	Full Term Credit H	ours		Half Term Credit Hours		
	Undergraduate M	in: Graduat	e Min: 3	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate Ma	ax: Graduat	e Max: 3	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type Rackham Gradu	e ate Student				
	Repeatability					
	🗌 Course is Rep	eatable for Credit		Course is Y grad	led	
	Maximum numbe	r of repeatable cred	its:	\Box Can be taken more than once in the same term		

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				250	
Sub	ject: 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 (Instructor Co No Consent	Drop Consent Consent	Consent nsent	
	CURRENT LISTING		REQUESTED LISTING		
	Advisory Prerequisite (254 char) EECS 530		Advisory Prerequisite (254 char) ECE 530		
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)		
	Minimum grade requirement:		Minimum grade requirement:		
	Credit Exclusions		Credit Exclusions		
	Course Components	Graded Componer	nt Terms Typically Of ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summe	fered r	
Cog	nizant Faculty Member Name: Heat	th Hofmann	Cognizant Faculty Member Title:		
SIG Con	NATURES ARE REQUIRED FROM AL	L DEPARTMENTS INVOLV Email: vyas@umich.ed	ED (Please Print AND Sign Name) u Phone: 647-1754		
CoE Con	Curriculum nmittee Representative:	tercoperty	Print: Achilleas Anastasopoulos	Date:6/12/23	
CoE	Curriculum Committee Chair:		Print:	Date:	
Hor	ne Department Chair: Heart Homen	~	Print: Heath Hofmann	Date:6/12/23	
Cros	ss-Listed Department Chair:		Print:	Date:	

Cross-Listed Department Chair:

Cross-Listed Department Chair:

DEPARTMENTAL/COLLEGE USE ONLY

Print:

Print:

Date:

Date:

Current:	Requested:		
Course Description	<u>Course Description</u>		
Numerical techniques for antennas and scattering; integral	Numerical techniques for antennas and scattering; integral		
representation: solutions of integral equations: method of	representation: solutions of integral equations: method of		
moments, Galerkin's technique, conjugate gradient FFT;	moments, Galerkin's technique, conjugate gradient FFT;		
finite element methods for 2-D and 3-D simulations; hybrid	finite element methods for 2-D and 3-D simulations; hybrid		
finite element/boundary integral methods; applications:	finite element/boundary integral methods; applications:		
wire, patch and planar arrays; scattering composite	wire, patch and planar arrays; scattering composite		
structures.	structures.		
Class Length	<u>Class Length</u>		
Full term	Full term		
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>		
3	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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on 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		Course is Cross-Listed with Other Departments				
	Department	Subject	Catalog Number	Department	Subject	Catalog Number	
	Applied Physics - APPPHYS - 611, Physics - PHYSICS - 611		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 Ho Undergraduate Mi Undergraduate Ma	ours n: Graduat ax: Graduat	e Min: 3 e Max: 3	Half Term Credit H Undergraduate Mi Undergraduate Ma	ours n: Graduat ax: Graduat	e Min: e Max:	
	Course Credit Type Rackham Graduate Student						
	Repeatability Course is Rep Maximum number	eatable for Credit r of repeatable cred	its:	 Course is Y graded Can be taken more than once in the same term 			
Subject: Elec Engin & Computer Sci	Catalog: 634	253					
--	---	---	--	--	--		
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 (Instructor Con No Consent	Drop Consent 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)		Enforced Prerequisite (254 char)					
Minimum grade requirement: Credit Exclusions		Minimum grade requirement: Credit Exclusions					
Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componer	It Terms Typically Offered ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer					
Cognizant Faculty Member Name: Herbert Winful Cognizant Faculty Member Title:							
IGNATURES ARE REQUIRED FROM AL Contact Person: Punam Vyas	L DEPARTMENTS INVOLV Email: vyas@umich.ed	ED (Please Print AND Sign Name) u Phone: 647-1754					

Committee Representative:	Print: Achilleas Anastasopoulos	Date:7/12/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: Heath Hofman	Print: Heath Hofmann	Date:7/12/23
Cross-Listed Department Chair: LWK	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:

Current:	Requested:
<u>Course Description</u>	<u>Course Description</u>
Formalism of wave propagation in nonlinear media;	Formalism of wave propagation in nonlinear media;
susceptibility tensor; second harmonic generation and	susceptibility tensor; second harmonic generation and
three-wave mixing; phase matching; third order	three-wave mixing; phase matching; third order
nonlinearities and four-wave mixing processes; stimulated	nonlinearities and four-wave mixing processes; stimulated
Raman and Brillouin scattering. Special topics: nonlinear	Raman and Brillouin scattering. Special topics: nonlinear
optics in fibers, including solitons and self-phase	optics in fibers, including solitons and self-phase
modulation.	modulation.
<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	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.

3



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

-		
Act	ion Requested □ New Course ☑ Modification of Existing Course □ Deletion of Existing Course	Date of Submission: 2023-07-24 Effective Term: Fall 2024
Ø	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed:

Completed By:

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING			
	Dept (Home): Physics Subject: PHYSICS Catalog: 542			Dept (Home): Physics Subject: PHYSICS Catalog: 542			
	☑ Course is Cr	oss-Listed with Oth	er Departments	Course is Cr	Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number	
E E	Elec Eng Comp Sci - EECS - 638			Elec Comp Eng - ECE - 638			
	Course Title (full title)			Course Title (full title)			
	Abbreviated Title (20 char)		Abbreviated Title (20 short)			
	Quantum Op	otics		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.					ous emission; ed atoms and	
	Full Term Credit Ho	ours		Half Term Credit Ho	ours		
	Undergraduate Mi	n: Graduate	e Min: 3	Undergraduate Mir	n: Graduate	Min:	
	Undergraduate Max: Graduate Max: 3		Undergraduate Max	raduate Max: Graduate Max:			
	Course Credit Type Rackham Gradua	ite Student					
	Repeatability						
	Course is Repeared	atable for Credit		□ Course is Y graded			
	Maximum number of repeatable credits:			□ Can be taken more than once in the same term			

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						256
Sub	ect: 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 (Instructor Con No Consent	Consent nsent	Drop	Consent Department Co Instructor Conse No Consent	nsent ent
	CURRENT LISTING		REQUEST	ED LISTING		
	Advisory Prerequisite (254 char) PHYSICS, Quantum mechanics, ele atomic physics.	ectrodynamic and	Advisory PHYS atomic ph	Prerequisite (25 SICS,Quantum n Nysics.	4 char) nechanics, elect	trodynamic and
	Minimum grade requirement:		Minimum	grade requiren	nent:	
	Credit Exclusions		Credit Exc	lusions		2
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componer	nt	Term ☑ Fal ☑ Wi □ Sp □ Su □ Sp	s Typically Offer nter ring mmer ring/Summer	red
Cog	nizant Faculty Member Name: Mackillo K	Lira	Cognizant	Faculty Memb	er Title:	
SIGN Con	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 Com	Curriculum mittee Representative:	ny	Print:	Achilleas Anas	tasopoulos	Date: 7/24/23
CoE	Curriculum Committee Chair:		Print:			Date:
Home Department Chair:			Print:	Print: Date:		Date:
Cros	s-Listed Department Chair: Heath	Hofman	Print:	Heath Hofman	n	Date: 7/24/23
Cros	s-Listed Department Chair	a free	Print:	Tom Schwarz	(Physics)	Date: 8/11/23
Cros	s-Listed Department Chair:	KL	Print:	Cagliyan	Kurda K	Date: 8/14/23
			u			

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.

<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	3
Contact hours (recitation)	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.

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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Action Requested ☐ New Course ☑ Modification of Existing Course		Date of Submission: 2023-07-13 Effective Term: Fall 2024		
	Deletion of Existing Course			
Ŋ	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:		

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
Ŋ	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 650			Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 650		
	🗆 Course is Cr	ross-Listed with Oth	er Departments	🗆 Course is C	ross-Listed with Ot	her Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	tle)		Course Title (full ti	tle)	
	Channel Coc	ling Theory		Channel Coding Theory		
	Abbreviated Title ((20 char)		Abbreviated Title (20 char)		
	Chanel Coding	g Thry		Chanel Coding Thry		
_	Course Description	n (Please limit to 50	words and attach se	eparate sheet if nece	essary)	
	The theory o	of channel coding fo	r reliable communic	cation and computer	memories. Error c	orrecting codes;
	variety of channels	s	encoding and decod	aing algorithms; per	formance evaluation	on of codes on a
	Full Term Credit H	ours		Half Term Credit H	OURS	
	Undergraduate Mi	in: Graduat	e Min [.] 3	Undergraduate Mi	n. Gradua	te Min [.]
	Undergraduate Ma	ax: Graduat	e Max: 3	Undergraduate Max: Graduate Max:		te Max:
	Course Credit Type	2				
	Rackham Gradu	ate Student				
	Repeatability					
	Course is Repeatable for Credit		Course is Y graded			
	Maximum number of repeatable credits:		\Box Can be taken more than once in the same term			

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				259		
Sub	ject: 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 Instructor Co No Consent	Drop Consent Consent	onsent sent		
	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)		Enforced Prerequisite (254 char)			
	Minimum grade requirement:		Minimum grade requirement:			
	Credit Exclusions		Credit Exclusions			
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Component Graded Component	nt Terms Typically Off Fall Winter Spring Summer Spring/Summer	ered		
Cog	nizant Faculty Member Name: Achi	lleas Anastasopoulos	Cognizant Faculty Member Title:			
SIGI Con	SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name) Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 647-1754					
Con	nmittee Representative:	n ty	Print: Achilleas Anastasopoulos	Date:7/13/23		
CoE	Curriculum Committee Chair:		Print:	Date:		
Home Department Chair: Heath Hyman		Print:Heath Hofmann	Date:7/13/23			
Cros	ss-Listed Department Chair:		Print:	Date:		
Cross-Listed Department Chair: Print: Date:			Date:			
Cros	ss-Listed Department Chair:		Print:	Date:		

Current: **Requested: Course Description Course Description** The theory of channel coding for reliable communication The theory of channel coding for reliable communication and computer memories. Error correcting codes; linear, and computer memories. Error correcting codes; linear, cyclic and convolutional codes; encoding and decoding cyclic and convolutional codes; encoding and decoding algorithms; performance evaluation of codes on a variety algorithms; performance evaluation of codes on a variety of channels. of channels. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 3 3 Contact hours (recitation) Contact hours (recitation) Contact hours (lab) Contact hours (lab)

260

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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Action Requested 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

	CURRENT LISTING			REQUESTED LISTING		
Ŋ	Dept (Home): Electrical & Computer Engineering Subject: EECS Catalog: 659			Dept (Home): Elec Engin & Computer Sci Subject: ECE Catalog: 659		
	Course is C	ross-Listed with Oth	er Departments	🗆 Course is C	ross-Listed	with Other Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	itle)		Course Title (full title)		
	Adaptive Sig	gnal Processing		Adaptive Signal Processing		
	Abbreviated Title (20 char)		Abbreviated Title (20 char)			
	Adapt Signal Proc Adapt Signal Proc					
_	Course Description	n (Please limit to 50	words and attach se	eparate sheet if necessary)		
	Theory and	applications of adap	otive filtering in syste	ems and signal processing. Iterative methods of		
	optimization and t	their convergence p	roperties: transvers	al filters; LIVIS (gradi	ent) algoritr	hms. Adaptive Kalman
	systelic arrays An	squares algorithms.	ion noise concelling	speech processing and beam forming		
	Eull Torm Credit H		ion, noise cancening	Half Term Credit Hours		
	Undergraduate Mi	in: Graduat	o Min: 3	Undergraduate Mi	n.	Graduate Min:
	Undergraduate M	ax: Graduat	e Max: 3	Undergraduate Ma	н. ах:	Graduate Max:
	Course Credit Type			endergradate int		
	Rackham Gradu	ate Student				
	Repeatability					
	□ Course is Repeatable for Credit		Course is Y graded			
	Maximum number of repeatable credits:			\Box Can be taken more than once in the same term		



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				262
Subj	ject: Electrical & Computer Engineer	ring 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 C □ Instructor Con ☑ No Consent	Drop Consent onsent	Consent Isent
	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)		Enforced Prerequisite (254 char)	
	Minimum grade requirement:		Minimum grade requirement:	
	Credit Exclusions		Credit Exclusions	
Course Components Graded Component Image: Course Components Image: Course Component Image: Course Course Course Course Image: Course Course Course Image: Course Course Course Course Course Image: Course Course Course Course Course Image: Course C		nt Terms Typically Offered ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer		
Cog	nizant Faculty Member Name: Alfree	d Hero	Cognizant Faculty Member Title:	
SIGI Con	NATURES ARE REQUIRED FROM ALL	DEPARTMENTS INVOLVI	E D (Please Print AND Sign Name) Phone: 647-1754	
CoE Com	Curriculum mittee Representative:	openty	Print: Achilleas Anastasopoulos	Date:7/13/21
CoE Curriculum Committee Chair:		Print: Date:		
Home Department Chair: Heath Hofman		Print:Heath Hofmann	Date:7/13/21	
Cross-Listed Department Chair:			Print: Date:	
Cross-Listed Department Chair:			Print: Date:	
Cros	ss-Listed Department Chair:		Print:	Date:

Current: **Requested: Course Description Course Description** Theory and applications of adaptive filtering in systems Theory and applications of adaptive filtering in systems and signal processing. Iterative methods of optimization and signal processing. Iterative methods of optimization and their convergence properties: transversal filters; LMS (gradient) algorithms. Adaptive Kalman filtering and (gradient) algorithms. Adaptive Kalman filtering and least-squares algorithms. Specialized structures for least-squares algorithms. Specialized structures for implementation; e.g., least-squares lattice filters, systolic implementation; e.g., least-squares lattice filters, systolic arrays. Applications to detection, noise cancelling, speech processing, and beam forming. processing, and beam forming. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 3 3

Contact hours (recitation)

Contact hours (lab)

and their convergence properties: transversal filters; LMS arrays. Applications to detection, noise cancelling, speech

Contact hours (recitation)

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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested New Course Modification of Existing Course Deletion of Existing Course 	Date of Submission: 2023-05-10 Effective Term: Fall 2024
V	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:

CURRENT LISTING

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 Cr	Course is Cross-Listed with Other Departments			ross-Listed with Otl	ner Departments
Department	Subject	Catalog Number	Department	Subject	Catalog Number
Course Title (full title)		Course Title (full title)			
Special Topic	cs in Computer Arch	nitecture	Special Topics in Computer Architecture		
Abbreviated Title (20 char)			Abbreviated Title (20 char)		
Spec Top Comp Arch			Spec Top Comp Arch		
Course Description	Course Description (Please limit to 50 words and attach separate sheet if necessary)				
Current topi	cs of interest in con	nputer architecture.	This course may be repeated for credit.		
Full Term Credit Ho	ours		Half Term Credit Hours		
Undergraduate Mi	n: Graduat	e Min: 3	Undergraduate Min: Graduate Min:		e Min:
Undergraduate Ma	ax: Graduat	e Max: 3	Undergraduate Max: Graduate Max:		e Max:
Course Credit Type	5				
Rackham Gradua	ate Student, Non-Ra	ackham Graduate St	udent		
Repeatability					
🗹 Course is Rep	eatable for Credit		Course is Y graded		
Maximum number of repeatable credits: 6		\Box Can be taken more than once in the same term			

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				265
Sub	ject: 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 Instructor Co No Consent	Drop Consent Consent	Consent onsent
	CURRENT LISTING		REQUESTED LISTING	
	Advisory Prerequisite (254 char) standing and permission of ins	EECS 570, Graduate tructor.	Advisory Prerequisite (254 char) CSE standing and permission of instructor	570, Graduate or.
	Enforced Prerequisite (254char)		Enforced Prerequisite (254 char)	
	Minimum grade requirement:		Minimum grade requirement:	
	Credit Exclusions		Credit Exclusions	
	Course Components	Graded Componer	nt Terms Typically O	ffered
	🗆 Seminar		✓ Fall	
	Recitation		✓ Winter	
	🗆 Lab			
	Discussion			Nr.
	🔲 Independent Study			:1
Cog	nizant Faculty Member Name: Mov	ver Provost Emily	Cognizant Faculty Member Title:	
SIGI	NATURES ARE REQUIRED FROM AL	L DEPARTMENTS INVOLV	/ED (Please Print AND Sign Name)	
Con	tact Person: Punam Vyas	Email: vyas@umich.ec	lu Phone: 734-647-17	54
CoE Com	CoE CurriculumCommittee Representative:OutputOutputPrint: Amir KamilDate: 5/17/23			
CoE	Curriculum Committee Chair:		Print:	Date:
Hon	ne Department Chair:	A A	Print: Emily Mower Provost	Date: 5/18/23
Cross-Listed Department Chair: Print:			Print:	Date:
Cross-Listed Department Chair: Print: Date:				Date:
Cros	ss-Listed Department Chair:		Print:	Date:

Current: **Requested: Course Description Course Description** Current topics of interest in computer architecture. This Current topics of interest in computer architecture. This course may be repeated for credit. course may be repeated for credit. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 3 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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on 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

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 Cr	ross-Listed with Oth	er Departments	🗆 Course is C	ross-Listed with Otl	ner Departments
Department	Subject	Catalog Number	Department	Subject	Catalog Number
Course Title (full ti	itle)		Course Title (full title)		
Advanced Artificial Intelligence		Advanced Artificial Intelligence			
Abbreviated Title (20 char)			Abbreviated Title (20 char)		
Adv Artif Intellig			Adv Artif Intellig		
Course Description	n (Please limit to 50	words and attach se	eparate sheet if nece	essary)	
Exploration	of advanced topics	in Artificial Intelliger	nce, intended as pre	paration for researd	ch in the field.
Emphasizes resear	rch methods and pra	actice, through expli	cit instruction, analy	sis of current litera	ture, and a term
project devoted to	o replicating publish	ed findings. Coursev	vork comprises exte	nsive reading, resea	arch and writing
assignments, pres	entations, quizzes, a	and the replication p	roject.		
Full Term Credit H	ours		Half Term Credit H	ours	
Undergraduate Mi	in: Graduat	e Min: 4	Undergraduate Mi	n: Graduat	te Min:
Undergraduate Ma	ax: Graduat	e Max: 4	Undergraduate Ma	ax: Graduat	te Max:
Course Credit Type					
Rackham Gradu	ate Student, Non-R	ackham Graduate St	udent		
Repeatability					
🗆 Course is Rep	eatable for Credit		Course is Y graded		
Maximum number of repeatable credits:			\square Can be taken more than once in the same term		

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					268
Sub	ject: 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 C Instructor Cor No Consent	Consent Isent	Drop Consent Department C Instructor Cor No Consent	onsent Isent
	CURRENT LISTING		REQUESTED	LISTING	
	Advisory Prerequisite (254 char)		Advisory Pre	erequisite (254 char)	
	Enforced Prerequisite (254 char) EECS 592 or 492; (C or better, No Minimum grade requirement: C	OP/F)	Enforced Prerequisite (254 char) CSE 592 or EECS 492; (C or better, No OP/F) Minimum grade requirement: C		DP/F)
	Credit Exclusions		Credit Exclu	sions	
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componen	t	Terms Typically Off ✓ Fall ✓ Winter □ Spring □ Summer □ Spring/Summer	ered
Cog	nizant Faculty Member Name: Micl	nael Wellman	Cognizant Fa	aculty Member Title:	
SIG	NATURES ARE REQUIRED FROM AL	L DEPARTMENTS INVOLV	ED (Please Pr	rint AND Sign Name)	
Contact Person: Punam Vyas Email: vyas@umich.edu Phone: 734-647-1754					
CoE Curriculum					

		Print: Amir Kamii	Date: 5/17/25	
CoE Curriculum Committee Chai	r:	Print:	Date:	
Home Department Chair:	Emost for	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/COLLEC	GE USE ONLY
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Current:	Requested:
Course Description	Course Description
Exploration of advanced topics in Artificial Intelligence,	Exploration of advanced topics in Artificial Intelligence,
intended as preparation for research in the field.	intended as preparation for research in the field.
Emphasizes research methods and practice, through	Emphasizes research methods and practice, through
explicit instruction, analysis of current literature, and a	explicit instruction, analysis of current literature, and a
term project devoted to replicating published findings.	term project devoted to replicating published findings.
Coursework comprises extensive reading, research and	Coursework comprises extensive reading, research and
writing assignments, presentations, quizzes, and the	writing assignments, presentations, quizzes, and the
replication project.	replication project.
<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
4	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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on 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

	CURRENT LISTING			REQUESTED LISTING		
Ŋ	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			🗆 Course is C	ross-Listed with Otl	ner Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	tle)		Course Title (full ti	tle)	
	Master's The	esis		Master's Thesis		
	Abbreviated Title (20 char)			Abbreviated Title (20 char)		
	Master's Thesis			Master's Thesis		
	Course Description	n (Please limit to 50	words and attach se	eparate sheet if nece	essary)	
	To be electe	d by CSE students p	ursuing the master's	s thesis option. May	be taken more that	n once up to a
	total of 6 credit ho	ours. To be graded o	n a satisfactory/uns	atisfactory basis ON	LY.	
	Full Term Credit Ho	ours		Half Term Credit Hours		
	Undergraduate Mi	in: Graduat	e Min: 1	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate Ma	ax: Graduat	e Max: 6	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type	2				
	Rackham Graduate Student					
	Repeatability					
	🗹 Course is Rep	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits: 999		\Box Can be taken more than once in the same term			

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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
K	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
N	Course ComponentsGraded ComponentLectureISeminarIRecitationILabIDiscussionIIndependent StudyI	nt 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

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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:

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.
<u>Class Length</u> Full term	<u>Class Length</u> 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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested □ New Course ☑ Modification of Existing Course □ Deletion of Existing Course	Date of Submission: 2023-05-24 Effective Term: Fall 2024
Ŋ	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:

CURRENT LISTING

	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 Cr	ross-Listed with Oth	er Departments	🗆 Course is C	ross-Listed with 0	Other Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	tle)		Course Title (full title)		
	Research Wo	ork EECS		Research Work in CSE		
	Abbreviated Title (20 char)		Abbreviated Title (20 char)			
¥.	Res Work in EECS		Res Work CSE			
	Course Description	Course Description (Please limit to 50 words and attach separate sheet if necessary)				
	Students wo	orking under the sup	pervision of a faculty	member plan and e	execute a researc	h project. A formal
	report must be submitted. May be taken for credit more			han once up to a to	al of 6 credit hou	irs. To be graded
	satisfactory/ unsatisfactory ONLY.					
	Full Term Credit Hours		Half Term Credit Hours			
	Undergraduate Mi	in: Graduat	e Min: 1	Undergraduate Mi	n: Gradu	iate Min:
	Undergraduate Ma	ax: Graduat	e Max: 6	Undergraduate Ma	ax: Gradu	iate Max:
	Course Credit Type					
	Rackham Graduate Student					
	Repeatability					
	🗹 Course is Rep	eatable for Credit		□ Course is Y graded		
	Maximum number of repeatable credits: 999		\Box Can be taken more than once in the same term			

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Ann Arbor, MI 48109-1382

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				274
Subj	ect: 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 (Instructor Co No Consent 	Drop Consent Consent	onsent Isent
	CURRENT LISTING		REQUESTED LISTING	
	Advisory Prerequisite (254 char) Graduate standing and perm	ission of instructor.	Advisory Prerequisite (254 char) Graduate standing and permissior	n of instructor.
	Enforced Prerequisite (254 char)		Entorced Prerequisite (254 char)	
	Minimum grade requirement:		Minimum grade requirement:	
	Credit Exclusions		Credit Exclusions	
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study 	Graded Componer	nt Terms Typically Off ☑ Fall ☑ Winter ☑ Spring ☑ Summer ☑ Spring/Summer	ered
Cog	nizant Faculty Member Name: Emil	y Mower Provost	Cognizant Faculty Member Title:	
SIG	NATURES ARE REQUIRED FROM AL	L DEPARTMENTS INVOLV	ED (Please Print AND Sign Name)	
Con	tact Person: Punam Vyas	Email:vyas@umich.ed	u Phone:734-647-1754	
CoE Curriculum Committee Representative:		(infland)	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:
Cros	s-Listed Department Chair:		Print:	Date:
Cros	s-Listed Department Chair:		Print:	Date:

Current: **Requested:** Course Description **Course Description** Students working under the supervision of a faculty Students working under the supervision of a faculty member plan and execute a research project. A formal member plan and execute a research project. A formal report must be submitted. May be taken for credit more report must be submitted. May be taken for credit more than once up to a total of 6 credit hours. To be graded than once up to a total of 6 credit hours. To be graded satisfactory/ unsatisfactory ONLY. satisfactory/ unsatisfactory ONLY. Class Length Class Length Full term 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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	Action Requested					
	 New Course Modification of Existing 	Date of Submission: 2023-07-13				
	Course	Effective Term: Fall 2024				
	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:				

CURRENT LISTING

CURRENT LISTING			REQUESTED LISTING		
Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 700		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 700		ngineering	
□ Course is Cross-Listed with Other Departments		🗆 Course is C	ross-Listed with Otl	her Departments	
Department	Subject	Catalog Number	Department	Subject	Catalog Number
Course Title (full ti	tle)		Course Title (full title)		
Special Topi	cs in System Theory		Special Topic	cs in System Theory	,
Abbreviated Title (20 char)		Abbreviated Title (20 char)			
Spc Topc Sys Thry		Spc Topc Sys Thry			
Course Description	Course Description (Please limit to 50 words and attach separate sheet if necessary)				
Special topic	cs of current interes	t in system theory.			
Full Term Credit Hours		Half Term Credit Hours			
Undergraduate Mi	n: Graduat	e Min: 1	Undergraduate Mi	n: Graduat	e Min:
Undergraduate Ma	ax: Graduat	e Max: 16	Undergraduate Ma	ax: Graduat	te Max:
Course Credit Type	5				
Rackham Gradu	ate Student				
Repeatability					
🗆 Course is Rep	eatable for Credit		Course is Y graded		
Maximum number of repeatable credits:		\Box Can be taken more than once in the same term			

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				277	
Sub	ject: 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 Instructor Co No Consent	Drop Consent Consent	t Consent Consent	
	CURRENT LISTING		REQUESTED LISTING		
	Advisory Prerequisite (254 char) Permission of instructor (to b	be arranged)	Advisory Prerequisite (254 char) Permission of instructor (to be a	arranged)	
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)		
	Minimum grade requirement:		Minimum grade requirement:		
	Credit Exclusions		Credit Exclusions		
	Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Compone	nt Terms Typically C ☑ Fall ☑ Winter □ Spring □ Summer □ Spring/Summ	Dffered	
Cog	nizant Faculty Member Name: Heat	th Hofmann	Cognizant Faculty Member Title:		
SIGI Con	SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name) Contact Person: Nancy Slowey Email:nslowey@umich.edu Phone: 763-2305				
CoE Con	Curriculum Imittee Representative:	in the second	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:	
Cros	ss-Listed Department Chair:		Print:	Date:	
Cros	ss-Listed Department Chair:		Print:	Date:	

Current:

Course Description

Class Length Full term

Contact hours (lecture): 1 - 16

Contact hours (recitation)

Contact hours (lab)

Requested:

<u>Course Description</u> Special topics of current interest in system theory.

Class Length Full term

<u>Contact hours (lecture):</u> 1 - 16

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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested		
	New Course	Data of Submission, 2022 07 12	
	Modification of Existing	Effective Terms, Fell 2024	
	Course	Ellective lerm: Fall 2024	
	Deletion of Existing Course		
Ŋ	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY	
		Date Received:	
		Date Completed:	
		Completed By:	

CURRENT USTING

	CURRENT LISTING			REQUESTED LISTING			
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 720		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 720		ngineering		
	Course is Cr	oss-Listed with Oth	er Departments	Course is Ci	ross-Listed with Oth	er Departments	
	Department	Subject	Catalog Number	Department	Subject	Catalog Number	
	Course Title (full ti	itle)		Course Title (full ti	Course Title (full title)		
	Special Topics in Solid-State Devices, Integrated			Special Topics in Solid-State Devices, Integrated			
	Circuits, and Physi	cal Electronics		Circuits, and Physical Electronics			
	Abbreviated Title (20 char)			Abbreviated Title (20 char)			
	Topic S-State	e Dev		Topic S-State Dev			
	Course Description (Please limit to 50 words and attach s Special topics of current interest in solid-state devi quantum devices, noise, plasmas. This course may be tak		eparate sheet if nece ces, integrated circu en for credit more th	essary) its, microwave devid han once.	ces,		
	Full Term Credit H	ours		Half Term Credit H	ours		
	Undergraduate M	in: Graduat	e Min: 1	Undergraduate Mi	in: Graduat	e Min:	
	Undergraduate Ma	ax: Graduat	e Max: 4	Undergraduate Ma	ax: Graduat	e Max:	
	Course Credit Type Rackham Gradu	e ate Student					
	Repeatability						
	Course is Ren	eatable for Credit		□ Course is V graded			
	Maximum number of repeatable credits:			□ Can be taken more than once in the same term			

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Subject: Elec Engin & Computer Sci Cat	alog: 720	280		
Grading Basis Graded (A – E) Credit/No Credit Satisfactory/Unsatisfactory Business Administration Grading Not for Credit Not for Degree Credit Degree Credit Only	Add Consent Department C Instructor Con No Consent	Drop Consent onsent		
CURRENT LISTING REQUESTED LISTING				
Advisory Prerequisite (254 char) Permission of instructor		Advisory Prerequisite (254 char) Permission of instructor		
Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)		
Credit Exclusions		Credit Exclusions		
Course Components Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componen	t Terms Typically Offered □ Fall ☑ Winter □ Spring □ Summer □ Spring/Summer		
Cognizant Faculty Member Name: Yogesh Gianchandani Cognizant Faculty Member Title:				
SIGNATURES ARE REQUIRED FROM ALL DEI	PARTMENTS INVOLV	FD (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: Head Hyman	Print	: Heath Hofmann	Date: 7/19/23
Cross-Listed Department Chair:	Print	:	Date:

Cross-Listed Department Chair:

Cross-Listed Department Chair:

DEPARTMENTAL/COLLEGE USE ONLY

Print:

Print:

Date:

Date:

Current:

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

Contact hours (lecture): 1 - 4

Contact hours (recitation)

Contact hours (lab)

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.

Requested:

Class Length Full term

Contact hours (lecture): 1 - 4

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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested			
	New Course	Data of Submission, 2022 07 12		
	Modification of Existing	Effective Term: Fall 2024		
	Course			
	Deletion of Existing Course			
		RO USE ONLY		
Ø		Date Received:		
		Date Completed:		
	One term only	Completed By:		

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 730		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 730		ngineering	
	Course is Cro	oss-Listed with Othe	er Departments	Course is Cr	oss-Listed with Oth	er Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	tle)		Course Title (full title)		
	Special Topics in Electromagnetics		Special Topics in Electromagnetics			
	Abbreviated Title ((20 char)		Abbreviated Title (20 char)		
	Top Electron	nagnet		Top Electromagnet		
Ø	Course Description (Please limit to 50 words and attach se Special topics of current interest in electromagnetic			eparate sheet if nece cs.	essary)	
	Full Term Credit Ho	ours		Half Term Credit Hours		
	Undergraduate Mi	in: Graduat	e Min: 1	Undergraduate Mi	n: Graduate	e Min:
	Undergraduate Ma	ax: Graduat	e Max: 4	Undergraduate Ma	ax: Graduate	e Max:
	Course Credit Type	9				
	Rackham Gradua	ate Student				
	Repeatability					
	Course is Repeared to the course is Repeared to the course is a course of the course is a course of the course	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits:			\square Can be taken more than once in the same term		

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Sub	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 Cor □ Instructor Conse ☑ No Consent	Drop Consent nsent			
CURRENT LISTING REQUESTED LISTING						
	Advisory Prerequisite (254 char)	A	Advisory Prerequisite (254 char)			

	Permission of instructor		Permission of instructor	
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)	
	Minimum grade requirement:		Minimum grade requirement:	
	Credit Exclusions		Credit Exclusions	
	Course Components	Graded Componer	nt Terms Typically Offered	
	☑ Lecture	\checkmark		
	Seminar		□ Fall	
	Recitation			
	🗆 Lab			
	Discussion		□ Summer	
	Independent Study		□ Spring/Summer	
Cognizant Faculty Member Name: Kamal Sarabandi		abandi	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

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CoE Curriculum Committee Representative:	Print: Achilleas Anastasopoulos	Date: 8/4/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: Heath Hofman	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:

Current:

Course Description

Class Length Full term

Contact hours (lecture): 1 - 4

Contact hours (recitation)

Contact hours (lab)

Requested:

<u>Course Description</u> Special topics of current interest in electromagnetics.

Class Length Full term

Contact hours (lecture): 1 - 4

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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested			
	New Course	Data of Submission: 2022-07-12		
	Modification of Existing	Effective Term: Fall 2024		
	Course	Ellective lefili. Fall 2024		
	Deletion of Existing Course			
		RO USE ONLY		
Ø		Date Received:		
		Date Completed:		
		Completed By:		

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
Ŋ	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 735		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 735		ngineering	
	Course is Cre	oss-Listed with Othe	er Departments	Course is Ci	oss-Listed with Oth	er Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
_	Course Title (full ti	tle)		Course Title (full title)		
	Special Topics in the Optical Sciences		Special Topics in the Optical Sciences			
	Abbreviated Title (20 char)		Abbreviated Title (20 char)		
	Topic Optica	l Sci		Topic Optical Sci		
	Course Description	n (Please limit to 50	words and attach se	eparate sheet if nece	essary)	
	Key topics o	f current research ir	nterest in ultrafast p	henomena, short wa	avelength lasers, atc	omic traps,
	integrated optics,	nonlinear optics and	d spectroscopy. This	course may be take	n for credit more th	an once under
	different instructo	rs.				
	Full Term Credit Ho	ours		Half Term Credit Hours		
	Undergraduate Mi	n: Graduat	e Min: 1	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate Ma	ax: Graduat	e Max: 4	Undergraduate Max: Graduate Max:		e Max:
	Course Credit Type	2				
	Rackham Gradu	ate Student				
	Repeatability					
	Course is Repeared	eatable for Credit		Course is Y graded		
]	Maximum number of repeatable credits:			Can be taken more than once in the same term		

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Sub	ject: Elec Engin & Computer Sci Cat	alog: 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

CURRENT LISTING		REQUESTED LISTING	3	
	Advisory Prerequisite (254 char)		Advisory Prerequisit	te (254 char)
	Graduate standing and permission of instructor.		Graduate standing and permission of instructor.	
	Enforced Prerequisite (254 char)		Enforced Prerequisi	te (254 char)
	Minimum grade requirement:		Minimum grade req	uirement:
	Credit Exclusions		Credit Exclusions	
	Course Components	Graded Componer	nt	Terms Typically Offered
	Lecture			
	Seminar	\checkmark		⊠ Winter
	Recitation			
	🗆 Lab			
	Discussion			Summer
	Independent Study			
Cognizant Faculty Member Name: Heath Hofmann		ofmann	Cognizant Faculty N	lember 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

1	-1	~
Am	hopery	_

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:

Current:	Requested:
<u>Course Description</u>	<u>Course Description</u>
Key topics of current research interest in ultrafast	Key topics of current research interest in ultrafast
phenomena, short wavelength lasers, atomic traps,	phenomena, short wavelength lasers, atomic traps,
integrated optics, nonlinear optics and spectroscopy. This	integrated optics, nonlinear optics and spectroscopy. This
course may be taken for credit more than once under	course may be taken for credit more than once under
different instructors.	different instructors.
<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
1 - 4	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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested		
	New Course	Data of Submission: 2022-07-14	
	Modification of Existing	Effective Term: Fall 2024	
Course			
	Deletion of Existing Course		
Ŋ	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY	
		Date Received:	
		Date Completed:	
		Completed By:	

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
Ø	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)		Course Title (full title)			
	Special Topics in Communication and Information		Special Topics in Communication and Information			
	Theory		Theory			
	Abbreviated Title (20 char)		Abbreviated Title (20 char)			
	Top Comm&Inf Thry		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		Half Term Credit Hours			
	Undergraduate Mi	in: Graduat	e Min: 1	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate Ma	ax: Graduat	e Max: 16	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type	9				
	Rackham Graduate Student					
	Repeatability					
	Course is Repeatable for Credit		Course is Y graded			
	Maximum number of repeatable credits:		\square Can be taken more than once in the same term			

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Sub	ject: Elec Engin & Computer Sci	Catalog: 750			289
	Grading Basis ☐ Graded (A – E) ☐ Credit/No Credit ☐ Satisfactory/Unsatisfactory ☐ Pass/Fail ☐ Business Administration Gradi ☐ Not for Credit ☐ Not for Degree Credit ☐ Degree Credit Only	Add Consent Department Instructor Co No Consent	Consent onsent	Drop Consent Department Constructor Construct	onsent sent
	CURRENT LISTING		REQUESTED LIS	TING	
	Advisory Prerequisite (254 char)		Advisory Prerec	quisite (254 char)	
<u> </u>	Permission of instructor.		Permissior	n of instructor.	
_	Enforced Prerequisite (254 char)		Enforced Preree	quisite (254 char)	
Minimum grade requirement:			Minimum grado requirement:		
Credit Exclusions		Credit Exclusions			
				15	
	Course Components Graded Componer		ent Terms Tynically Offered		
	☑ Lecture	\checkmark			
	☑ Seminar		⊠ Winter		
	Recitation				
	🗆 Lab			Summer	
	Discussion				
	Independent Study				
Cog	nizant Faculty Member Name: Heath	n Hofmann	Cognizant Facu	ty Member Title:	
SIGI	NATURES ARE REQUIRED FROM ALL	DEPARTMENTS INVOL	VED (Please Print	AND Sign Name)	
Con	tact Person: Nancy Slowey	Email: nslowey@umi	ch.edu	Phone: 734-763-2305	5
CoE Con	Curriculum nmittee Representative:	Ŧ	Print: Achi	lleas Anastasopoulos	Date:7/20/2
CoE	Curriculum Committee Chair:		Print:		Date:
Hon	ne Department Chair:	fman	Print: Heat	h Hofmann	Date:7/20/2
Cros	ss-Listed Department Chair:		Print:		Date:

Cross-Listed Department Chair:

Cross-Listed Department Chair:

DEPARTMENTAL/COLLEGE USE ONLY

Print:

Print:

Date:

Date:

Current:	Requested:
Course Description	Course Description Special topics of current interest related to communication and information theory.
<u>Class Length</u> Full term	<u>Class Length</u> Full term
<u>Contact hours (lecture):</u> 1 - 16	<u>Contact hours (lecture):</u> 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:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Action Requested ☐ New Course ☑ Modification of Existing Course		Date of Submission: 2023-07-14 Effective Term: Fall 2024	
	Deletion of Existing Course		
	Course Offered ☑ Indefinitely □ One term only	RO USE ONLY Date Received: Date Completed: Completed By:	

CURRENT LISTING

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 Cr	ross-Listed with Oth	er Departments	🗆 Course is C	ross-Listed with Oth	ner Departments
Department	Subject	Catalog Number	Department	Subject	Catalog Number
Course Title (full ti	itle)		Course Title (full title)		
Special Topic	cs in Signal Processi	ng	Special Topics in Signal Processing		
Abbreviated Title ((20 char)		Abbreviated Title (20 char)		
Topics Signa	l Proc		Topics Signal Proc		
Course Description	n (Please limit to 50	words and attach se	eparate sheet if necessary)		
Advanced to	opics in Signal and/c	or image processing.	The specific topics	vary with each offer	ring.
Full Term Credit H	ours		Half Term Credit H	ours	
Full Term Credit Hours		Hadergraduate Min: Craduate Min:		e Min:	
Undergraduate Mi	ax:4 Graduat	e Max: 4	Undergraduate Max: Graduate Max:		e Max:
Course Credit Type					
Undergraduate Student, Rackham Graduate Student, N		on-Rackham Gradua	te Student		
Repeatability					
🗆 Course is Repe	eatable for Credit		Course is Y graded		
Maximum number of repeatable credits:			\square Can be taken more than once in the same term		

1210 LSA Building

291

500 S. State Street

Ann Arbor, MI 48109-1382

Phone: 734.763.2113

Fax: 734.936.3148

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					292
Sub	ject: 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 Instructor Co No Consent 	Consent Insent	Drop Consent Department Co Instructor Cons No Consent	onsent sent
CURRENT LISTING REQUESTED LISTING					
	Advisory Prerequisite (254 char)		Advisory Prerequis	ite (254 char)	
	Enforced Prerequisite (254 char)		Enforced Prerequis	ite (254 char)	
			Minimum grado ro	auiromont:	
	Credit Exclusions		Credit Exclusions		
	 Lecture Seminar Recitation Lab Discussion Independent Study 		int.	Terms Typically Offe	red
Cog	nizant Faculty Member Name: Jeffr	ey Fessler	Cognizant Faculty N	Member Title:	
SIGI Con CoE	SIGNATURES ARE REQUIRED FROM ALL DEPARTMENTS INVOLVED (Please Print AND Sign Name) Contact Person: Nancy Slowey Email: nslowey@umich.edu Phone: 734-763-2305				
	AL-L	north	Print:		
Committee Representative:			Achilleas Anas	stasopoulos	Date:7/20/23
CoE Curriculum Committee Chair:		Print:		Date:	
Hon	ne Department Chair:	Viman	Print: Heath H	ofmann	Date:7/20/23
Cros	ss-Listed Department Chair:		Print: Da		Date:
Cross-Listed Department Chair:			Print:		Date:

Cross-Listed Department Chair:

Print:

Date:

Current: **Course Description Course Description** Advanced topics in Signal and/or image processing. The specific topics vary with each offering. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 1 - 4 Contact hours (recitation) Contact hours (recitation)

Contact hours (lab)

1 - 4

Advanced topics in Signal and/or image processing. The specific topics vary with each offering.

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.

Requested:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested			
	New Course	Data of Submission, 2022 07 14		
	Modification of Existing	Effective Term: Fall 2024		
	Course			
	Deletion of Existing Course			
		RO USE ONLY		
	Course Offered	Date Received:		
КI	 Indefinitely One term only 	Date Completed:		
		Completed By:		

CURRENT USTING

	CURRENT LISTING			REQUESTED LISTING		
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 760		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 760			
	Course is Cro	oss-Listed with Othe	er Departments	Course is Cr	oss-Listed with Oth	er Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
п	Course Title (full title)		Course Title (full title)			
	Special Topics in Control Theory		Special Topics in Control Theory			
	Abbreviated Title (20 char)			Abbreviated Title (20 char)		
	Topc Contro	l Thry		Topc Control Thry		
	Course Descriptior	n (Please limit to 50	words and attach se	eparate sheet if nece	essary)	
Ø	Special topic	cs of current interes	t related to control 1	heory.		
	Full Term Credit Ho			Half Term Credit H	ours	
	Undergraduate Mi	n: Graduat	e Min· 1	Undergraduate Mi	n: Graduat	e Min
	Undergraduate Max: Graduate Max: 16		Undergraduate Max: Graduate Max:		e Max:	
	Course Credit Type			-		
	Rackham Gradua	ate Student				
	Repeatability					
	Course is Repeared to the course is repea	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits:		Can be taken more than once in the same term			

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Sub	iject: Elec Engin & Computer Sci Cat	alog: 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)		Advisory Prerequis	ite (254 char)
	Permission of instructor.		Permission of instr	uctor.
	Enforced Prerequisite (254 char)		Enforced Prerequis	site (254 char)
	Minimum grade requirement:		Minimum grade re	quirement:
	Credit Exclusions		Credit Exclusions	
	Course Components	Graded Componer	nt	Torms Typically Offored
	☑ Lecture	\checkmark		
	Seminar			⊠ Tan ⊠ Winter
	Recitation			
	🗆 Lab			Summer
	Discussion			Summer Summer
	Independent Study			
Cogi	nizant Faculty Member Name: Heath Ho	fmann	Cognizant Faculty I	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

295

CoE Curriculum Committee Representative:	Print: Achilleas Anastasopoulos	Date: 8/4/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: Heath Hyman	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:

Course Description

Class Length Full term

Contact hours (lecture): 1 - 16

Contact hours (recitation)

Contact hours (lab)

Requested:

<u>Course Description</u> Special topics of current interest related to control theory.

Class Length Full term

<u>Contact hours (lecture):</u> 1 - 16

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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested			
	New Course	Data of Submission, 2022 07 14		
	Modification of Existing	Effective Terms, Fell 2024		
	Course	Effective ferm: Fail 2024		
	Deletion of Existing Course			
		RO USE ONLY		
		Date Received:		
R		Date Completed:		
	□ One term only	Completed By:		

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 765		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 765			
	Course is Cre	oss-Listed with Othe	er Departments	Course is Cr	oss-Listed with Oth	er Departments
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	tle)		Course Title (full title)		
	Special Topic	cs in Stochastic Syst	ems and Control	Special Topics in Stochastic Systems and Control		
	Abbreviated Title (20 char)			Abbreviated Title (20 char)		
	Stoch Sys Co	on		Stoch Sys Con		
	Course Description	n (Please limit to 50	words and attach se	eparate sheet if nece	essary)	
here	Advanced topics o	n stochastic system	s such as stochastic	calculus, nonlinear f	iltering, stochastic a	idaptive control,
	decentralized cont	rol and queuing net	works.			
	Full Term Credit Ho	ours		Half Term Credit Hours		
	Undergraduate Mi	in: Graduat	e Min: 3	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate Max: Graduate Max: 3		Undergraduate Max: Graduate Max:		e Max:	
	Course Credit Type	2				
	Rackham Graduate Student					
	Repeatability					
	Course is Repeared	eatable for Credit		Course is Y graded		
	Maximum number of repeatable credits:		Can be taken more than once in the same term			

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Sub	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

	CURRENT LISTING		REQUESTED LISTI	NG
	Advisory Prerequisite (254 char)		Advisory Prerequis	site (254 char)
	Permission of instructor.		Permission of inst	ructor. site (254 char)
	Minimum grade requirement:		Minimum grade re	equirement:
	Credit Exclusions		Credit Exclusions	
	Course Components	Graded Compone	nt	Terme Typically Offered
	☑ Lecture	\checkmark		
	Seminar			☑ Fall
	Recitation			
	🗆 Lab			Symmer
	Discussion			Spring/Summer
	Independent Study			
Cognizant Faculty Member Name: Heath Hofmann		ofmann	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

Date: 7/20/23

Date:

Print: Achilleas Anastasopoulos

CoE Curriculum

Committee Representative:	Amarticoparty
committee Representative:	

CoE Curriculum Com	mittee Chair:

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:

Print:

Current:	Requested:
<u>Course Description</u>	<u>Course Description</u>
Advanced topics on stochastic systems such as stochastic	Advanced topics on stochastic systems such as stochastic
calculus, nonlinear filtering, stochastic adaptive control,	calculus, nonlinear filtering, stochastic adaptive control,
decentralized control and queuing networks.	decentralized control and queuing networks.
<u>Class Length</u>	<u>Class Length</u>
Full term	Full term
<u>Contact hours (lecture):</u>	<u>Contact hours (lecture):</u>
3	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:



Office of the Registrar, University of Michigan

☑ CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested	
	New Course	Data of Submissions 2022 07 14
	Modification of Existing	Effective Terms, Fell 2024
	Course	Effective lerm: Fall 2024
Deletion of Existing Course		
	Course Offerred	RO USE ONLY
Ø	 ☐ Indefinitely ☐ One term only 	Date Received:
		Date Completed:
		Completed By:

CURRENT USTING

	CURRENT LISTING			REQUESTED LISTING			
Ø	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 820		Dept (Home): Electrical & Computer Engineering Subject: ECE Catalog: 820				
	Course is Cre	oss-Listed with Othe	er Departments	Course is Cr	Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number	
	Course Title (full title)		Course Title (full title)				
	Seminar in S	olid-State Electroni	cs	Seminar in Solid-State Electronics			
	Abbreviated Title (20 char)		Abbreviated Title (20 char)				
	Sem S-S Elec		Sem S-S Elec	:			
	Course Description (Please limit to 50 words and attach separate sheet if necessary)						
	Advanced gr	raduate seminar dev	oted to discussing o	current research topics in areas of solid-state electronics.			
	Specific topics vary	y each time the cou	rse is offered. Cours	e may be elected mo	ore than once.		
	Full Term Credit Ho	ours		Half Term Credit Hours			
	Undergraduate Mi	n: Graduat	e Min: 1	Undergraduate Mi	n: Graduat	e Min:	
	Undergraduate Max: Graduate Max: 1		Undergraduate Max: Graduate Max:		e Max:		
	Course Credit Type	2					
	Rackham Graduate Student						
	Repeatability						
	Course is Repeared	eatable for Credit		Course is Y graded			
	Maximum number	r of repeatable cred	its:	🗆 Can be taken me	ore than once in the	e same term	

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Sub	ject: Elec Engin & Computer Sci Cata	alog: 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
		REQUESTED	USTING

CURRENT LISTING

Advisory Prerequisite (254 char)	Advisory Prereguisite (254 char)
, and only increasing (20 Femaly)	, , , ,
Graduate standing and permission of instructor.	Graduate standing and permission of instructor.
Enforced Prerequisite (254 char)	Enforced Prerequisite (254 char)
Minimum grade requirement:	Minimum grade requirement:
Credit Exclusions	Credit Exclusions
Course Components Graded Compor	nent Terms Typically Offered
☑ Lecture ☑	
□ Seminar □	⊠ Winter
□ □ Recitation □	
🗆 Lab	□ Sµmg
□ Discussion □	\Box Spring/Summer
Independent Study	
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

301

CoE Curriculum Committee Representative:	Print: Achilleas Anastasopoulos	Date: 7/20/23
CoE Curriculum Committee Chair:	Print:	Date:
Home Department Chair: Heath Hyman	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

Course Description Course Description Advanced graduate seminar devoted to discussing current Advanced graduate seminar devoted to discussing current research topics in areas of solid-state electronics. Specific research topics in areas of solid-state electronics. Specific topics vary each time the course is offered. Course may topics vary each time the course is offered. Course may be elected more than once. be elected more than once. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture): 1 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:

Current:

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.

Requested:



Office of the Registrar, University of Michigan

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Acti	on Requested □ New Course ☑ Modification of Existing Course □ Deletion of Existing Course	Date of Submission: 2023-05-16 Effective Term: Fall 2024
V	Course Offered Indefinitely One term only	RO USE ONLY Date Received: Date Completed: Completed By:

CURRENT LISTING

	CURRENT LISTING			REQUESTED LISTING		
N	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		\Box Course is Cross-Listed with Other Departments			
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full ti	tle)		Course Title (full title)		
	Dissertation	/Pre-Candidate		Dissertation/Pre-Candidate		
	Abbreviated Title (20 char)			Abbreviated Title (20 char)		
	Diss-Precand			Diss-Precand		
	_ Course Description (Please limit to 50 words and attach s		eparate sheet if nece	essary)	6 .1	
	Dissertation	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 he			eld under a full-term	n candidacy enrollm	ent.
	Full Term Credit Hours			Half Term Credit Hours		
	Undergraduate Mi	n: Graduat	e Min: 1	Undergraduate Mi	n: Graduat	e Min:
	Undergraduate Ma	ax: Graduat	e Max: 8	Undergraduate Ma	ax: Graduat	e Max:
	Course Credit Type					
	Rackham Graduate Student					
	Repeatability					
	Course is Repeatable for Credit			Course is Y graded		
	Maximum number of repeatable credits: 999		\Box Can be taken more than once in the same term			

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				304
Sub	ject: 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 Instructor Co No Consent	Drop Consent Consent	onsent sent
	CURRENT LISTING		REQUESTED LISTING	
	Advisory Prerequisite (254 char): work by doctoral student not yet adr	Election for dissertation nitted as a Candidate.	Advisory Prerequisite (254 char): Electio work by doctoral student not yet admitted	n for dissertation as a Candidate.
	Enforced Prerequisite (254 char)		Enforced Prerequisite (254 char)	
	Minimum grade requirement:		Minimum grade requirement:	
	Credit Exclusions		Credit Exclusions	
Ŋ	Course Components Lecture Seminar Recitation Lab Discussion Independent Study 	Graded Componen	nt Terms Typically Offe Fall Winter Spring Summer Spring/Summer	red
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:

Current: **Requested: Course Description Course Description** Dissertation work by doctoral student not yet admitted to Dissertation work by doctoral student not yet admitted to status as candidate. The defense of the dissertation, that status as candidate. The defense of the dissertation, that is, the final oral examination, must be held under a is, the final oral examination, must be held under a full-term candidacy enrollment. full-term candidacy enrollment. Class Length Class Length Full term Full term Contact hours (lecture): Contact hours (lecture):

Contact hours (lab)

Contact hours (recitation)

Contact hours (lab)

Contact hours (recitation)

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:



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

	CURRENT LISTING			REQUESTED LISTING		
Ŋ	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 995			Dept (Home): Computer Science and Engineering Subject: CSE Catalog: 995		
	🗆 Course is Cr	ross-Listed with Oth	er Departments	\Box Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full title)			Course Title (full title)		
	Dissertation/Candidate		Dissertation/Candidate			
	Abbreviated Title (20 char)			Abbreviated Title (20 char)		
	Diss-Cand			Diss-Cand		
	Course Description (Please limit to 50 words and attach separate sheet if necessary)					
	Election for	dissertation work b	y a doctoral student	who has been admi	tted to candidate s	tatus. The defense
	of the dissertation, that is, the final oral examination, must be held u				ll-term candidacy e	enrollment.
	Full Term Credit Hours			Half Term Credit Hours		
	Undergraduate Min: Graduate Min: 4		Undergraduate Min: Graduate Min:		te Min:	
	Undergraduate Ma	ax: Graduat	e Max: 8	Undergraduate Ma	ix: Graduat	te Max:
	Course Credit Type					
	Rackham Graduate Student					
	Repeatability					
	Course is Repeatable for Credit			□ Course is Y graded		
	Maximum number of repeatable credits: 999			\Box Can be taken more than once in the same term		

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					307
Subj	ect: Elec Engin & Computer Sci	Catalog: 995			307
	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 Instructor Co No Consent 	Consent nsent	Drop Consent Departmen Instructor No Conser 	nt Consent Consent It
	CURRENT LISTING		REQUESTED LI	STING	
	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 Lecture Seminar Recitation Lab Discussion Independent Study	Graded Componer	ht	Terms Typically ☑ Fall ☑ Winter ☑ Spring ☑ Summer ☑ Spring/Sumr	Offered
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 CurriculumCommittee Representative:OwnfloadPrint: Amir KamilDate:			Date:		

CoE Curriculum Committee Chair:		Print:	Date:
Home Department Chair:	Enort San	Print: Emily Mower Provost	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:
Cross-Listed Department Chair:		Print:	Date:

Current:	Requested:
<u>Course Description</u> 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.
<u>Class Length</u> Full term	<u>Class Length</u> 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: