

UNIVERSITY OF MICHIGAN
College of Engineering
Curriculum Committee Meeting
Tuesday, April 7th, 2020
Via BlueJeans

Attending: Saafet Alabyrak, Won Sik Yang, Susan Montgomery, Yue Fan, Amy Hortop, Dale Karr, Christian Casper, Jwo Pan, Yavuz Bozer, Christin Rice, Edmund Durfee, Xueding Wang, Gretchen Keppel-Aleks, Leung Tsang, Emmanuelle Marquis, Fred Terry; Visiting Guests: Eric Rutherford; Supporting Staff: Betsy Dodge, Alyiah Al-Bonijim

Call to Order: 1:40

Adjourned: 2:32

AGENDA

1. 3.24.20 Meeting Minutes: APPROVED
2. Potential Agenda Items Scheduled for Joint Meeting

CARF SUMMARIES

PAGE	SUBJECT	COURSE #	ACTION	SUMMARY	EFFECTIVE TERM	MIN. GRADE REQ. FOR ENF. PREPREQ	APPROVED	NOTES & REVISIONS	TABLED
	EECS	200	MOD	Change to advisory prereqs	WN 2021		X	Signatures needed	
	EECS	215	MOD	Change to enforced prereqs	WN 2021		X	Signatures needed	
	MECHENG	570	New		WN 2021		X	Needed to be updated for abbreviated course title and course description	

UNIVERSITY OF MICHIGAN
College of Engineering
Curriculum Committee Meeting
Tuesday, April 7th, 2020
Via BlueJeans

Attending:

Call to Order:

Adjourned:

AGENDA

1. 3.10.20 Meeting Minutes: APPROVED, Christian Frederick Cooper abstained
2. Grades for WN 2020 and Future Effects

CARF SUMMARIES

PAGE	SUBJECT	COURSE #	ACTION	SUMMARY	EFFECTIVE TERM	MIN. GRADE REQ. FOR ENF. PREPREQ	APPROVED	NOTES & REVISIONS	TABLED
3	EECS	200	MOD	Change to course description and advisory prereqs	WN 2021				
6	EECS	215	MOD	Change to enforced prereqs	WN 2021				
9	MECHENG	570	New		WN 2021				

UNIVERSITY OF MICHIGAN
College of Engineering
Curriculum Committee Meeting
Tuesday, March 24th. 2020
Via BlueJeans

Attending: Amy Hortop, Christina Rice, Christian Frederick Casper, Christian Lastoskie, Dale Karr, Edmund Durfee, Fred Terry, Gretchen Keppel-Aleks, Jwo Pan, Krista Quinn, Leung Tsang, Saadest Albayrak, Susan Montgomery, Won Sik Yang, Xueding Wang, Yavuz Bozer, Yue Fan; **Visiting Guests:** Stacie Edington, Alyssa Bersine; **Supporting Staff:** Betsy Dodge, Alyiah Al-Bonijim

Call to Order: 1:32

Adjourned: 2:33

AGENDA

1. 3.10.20 Meeting Minutes: APPROVED, Christian Frederick Cooper abstained
2. ENGR 110 Presentation [*Frank Marsik presenting*]: Frank, the director of CoE engagement, worked with CRLT to complete the redesign of ENGR 110 to increase engagement, this pilot lended a small discussion and online module format.

CARF SUMMARIES

PAGE	SUBJECT	COURSE #	ACTION	SUMMARY	EFFECTIVE TERM	MIN. GRADE REQ. FOR ENF. PREPREQ	APPROVED	NOTES & REVISIONS	TABLED
	ENGR	110	MOD	Description is being updated	FA 2020		X		
	NERS	201	NEW		WN 2021		X		



Course Approval Request Form

Office of the Registrar, University of Michigan

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

CHECK APPROPRIATE BOXES FOR ALL CHANGES

Action Requested

- New Course
- Modification of Existing Course
- Deletion of Existing Course

Date of Submission: 2020-03-19
 Effective Term: Winter 2021

<input checked="" type="checkbox"/>	Course Offered <input checked="" type="checkbox"/> Indefinitely <input type="checkbox"/> One term only	RO USE ONLY Date Received: Date Completed: Completed By:
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CURRENT LISTING

REQUESTED LISTING

<input type="checkbox"/>	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 200	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 200												
<input type="checkbox"/>	<input type="checkbox"/> Course is Cross-Listed with Other Departments	<input type="checkbox"/> Course is Cross-Listed with Other Departments												
<input type="checkbox"/>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Department</th> <th style="width: 25%;">Subject</th> <th style="width: 50%;">Catalog Number</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Department	Subject	Catalog Number				<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Department</th> <th style="width: 25%;">Subject</th> <th style="width: 50%;">Catalog Number</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Department	Subject	Catalog Number			
Department	Subject	Catalog Number												
Department	Subject	Catalog Number												
<input type="checkbox"/>	Course Title (full title) Electrical Engineering Systems Design I	Course Title (full title) Electrical Engineering Systems Design I												
<input type="checkbox"/>	Abbreviated Title (20 char) Elec Eng Sys Des I	Abbreviated Title (20 char) Elec Eng Sys Des I												
<input checked="" type="checkbox"/>	Course Description (Please limit to 50 words and attach separate sheet if necessary) Gain a systems engineering perspective of electrical engineering centered around a design competition to address a societally-relevant challenge. Apply electrical engineering concepts in circuits, computing, control, sensors, optics, power, signal processing, and wireless communications to a system such as a robot, and adapt the system to achieve competition objectives within defined engineering constraints.													
<input checked="" type="checkbox"/>	Full Term Credit Hours Undergraduate Min: 2 Graduate Min: Undergraduate Max: 2 Graduate Max:	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:												
<input checked="" type="checkbox"/>	Course Credit Type Undergraduate Student													
<input type="checkbox"/>	Repeatability <input type="checkbox"/> Course is Repeatable for Credit <input type="checkbox"/> Course is Y graded Maximum number of repeatable credits: <input type="checkbox"/> Can be taken more than once in the same term													

Subject: Elec Engin & Computer Sci Catalog: 200

<input checked="" type="checkbox"/>	Grading Basis		
	<input checked="" type="checkbox"/> Graded (A – E) <input type="checkbox"/> Credit/No Credit <input type="checkbox"/> Satisfactory/Unsatisfactory <input type="checkbox"/> Pass/Fail <input type="checkbox"/> Business Administration	Add Consent <input type="checkbox"/> Department Consent <input type="checkbox"/> Instructor Consent <input checked="" type="checkbox"/> No Consent	Drop Consent <input type="checkbox"/> Department Consent <input type="checkbox"/> Instructor Consent <input checked="" type="checkbox"/> No Consent
	Grading		
	<input type="checkbox"/> Not for Credit <input type="checkbox"/> Not for Degree Credit <input type="checkbox"/> Degree Credit Only		

CURRENT LISTING**REQUESTED LISTING**

<input checked="" type="checkbox"/>	Advisory Prerequisite (254 char) ENGR 100, ENGR 101 or 151 (C or better for pre-requisites); Co-requisite: EECS 215, Minimum grade requirement: C	Advisory Prerequisite (254 char) ENGR 100 or ENGR 101 or ENGR 151 or EECS 180 or EECS 280. Co-requisite: EECS 215 Minimum grade of "C"
<input type="checkbox"/>	Enforced Prerequisite (254 char) Minimum grade requirement: C	Enforced Prerequisite (254 char) Minimum grade requirement: C
<input type="checkbox"/>	Credit Exclusions	Credit Exclusions
<input checked="" type="checkbox"/>	Course Components <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Seminar <input type="checkbox"/> Recitation <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Discussion <input type="checkbox"/> Independent Study	Graded Component <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		Terms Typically Offered <input checked="" type="checkbox"/> Fall <input checked="" type="checkbox"/> Winter <input type="checkbox"/> Spring <input type="checkbox"/> Summer <input type="checkbox"/> Spring/Summer
Cognizant Faculty Member Name: Jamie Phillips		Cognizant Faculty Member Title:

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

Contact Person:

Email:

Phone:

Punam Vyas

vyas@umich.edu

647-1754

Curriculum Committee Member:

Print:

Date:

Curriculum Committee Chair:

Print:

Date:

Home Department Chair:

Stephane Lafortune

Print:

Stephane Lafortune

Date: 3/20/2020

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

Gain a systems engineering perspective of electrical engineering centered around a design competition to address a societally-relevant challenge. Apply electrical engineering concepts in circuits, computing, control, sensors, optics, power, signal processing, and wireless communications to a system such as a robot, and adapt the system to achieve competition objectives within defined engineering constraints.

Course Description

Gain a systems engineering perspective of electrical engineering centered around a design competition to address a societally-relevant challenge. Apply electrical engineering concepts in circuits, computing, control, sensors, optics, power, signal processing, and wireless communications to a system such as a robot, and adapt the system to achieve competition objectives within defined engineering constraints.

Class Length

Full term

Class Length

Full term

Contact hours (lecture):

1

Contact hours (lecture):

1

Contact hours (recitation)Contact hours (recitation)Contact hours (lab)

3

Contact hours (lab)

3

Additional Info:Submitted by:

Home dept

Describe how this course fits with the degree requirements:ABET departmental program outcomes for undergraduate courses:

5,7

Special resources of facilities required for this course:Supporting statement:

The College of Engineering now accepts credit for the Computer Science AP exam. A score of 5 on the Computer Science A exam will qualify the student for EECS 180 credit (4 credits). A student with EECS 180 credit would then be allowed registered directly for EECS 280 without taking Engr 101, 151 or EECS 183. By making this change, students will be able to register for the course at the same time as other students who meet the programming requirements.



Course Approval Request Form

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CHECK APPROPRIATE BOXES FOR ALL CHANGES

Action Requested

- New Course
- Modification of Existing Course
- Deletion of Existing Course

Date of Submission: 2020-03-19
 Effective Term: Winter 2021

<input checked="" type="checkbox"/>	Course Offered <input checked="" type="checkbox"/> Indefinitely <input type="checkbox"/> One term only	RO USE ONLY Date Received: Date Completed: Completed By:
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CURRENT LISTING

REQUESTED LISTING

<input type="checkbox"/>	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 215	Dept (Home): Elec Engin & Computer Sci Subject: EECS Catalog: 215												
<input type="checkbox"/>	<input type="checkbox"/> Course is Cross-Listed with Other Departments	<input type="checkbox"/> Course is Cross-Listed with Other Departments												
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Department	Subject	Catalog Number												
<input type="checkbox"/>	Course Title (full title) Introduction to Electronic Circuits	Course Title (full title) Introduction to Electronic Circuits												
<input type="checkbox"/>	Abbreviated Title (20 char) Intro to Elect Circ	Abbreviated Title (20 char) Intro to Elect Circ												
<input checked="" type="checkbox"/>	Course Description (Please limit to 50 words and attach separate sheet if necessary) Introduction to electronic circuits. Basic Concepts of voltage and current; Kirchhoff's voltage and current laws; Ohm's law; voltage and current sources; Thevenin and Norton equivalent circuits; DC and low frequency active circuits using operational amplifiers, diodes, and transistors; small signal analysis; energy and power. Time- and frequency-domain analysis of RLC circuits. Basic passive and active electronic filters. Laboratory experience with electrical signals and circuits.													
<input checked="" type="checkbox"/>	Full Term Credit Hours Undergraduate Min: 4 Graduate Min: Undergraduate Max: 4 Graduate Max:	Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:												
<input checked="" type="checkbox"/>	Course Credit Type Undergraduate Student													
<input type="checkbox"/>	Repeatability <input type="checkbox"/> Course is Repeatable for Credit <input type="checkbox"/> Course is Y graded Maximum number of repeatable credits: <input type="checkbox"/> Can be taken more than once in the same term													

Subject: Elec Engin & Computer Sci Catalog: 215

<input checked="" type="checkbox"/>	Grading Basis		
	<input checked="" type="checkbox"/> Graded (A – E) <input type="checkbox"/> Credit/No Credit <input type="checkbox"/> Satisfactory/Unsatisfactory <input type="checkbox"/> Pass/Fail <input type="checkbox"/> Business Administration	Add Consent <input type="checkbox"/> Department Consent <input type="checkbox"/> Instructor Consent <input checked="" type="checkbox"/> No Consent	Drop Consent <input type="checkbox"/> Department Consent <input type="checkbox"/> Instructor Consent <input checked="" type="checkbox"/> No Consent
	Grading		
	<input type="checkbox"/> Not for Credit <input type="checkbox"/> Not for Degree Credit <input type="checkbox"/> Degree Credit Only		

CURRENT LISTING**REQUESTED LISTING**

<input type="checkbox"/>	Advisory Prerequisite (254 char) Cannot receive credit for both EECS 314 and EECS 215	Advisory Prerequisite (254 char) Cannot receive credit for both EECS 314 and EECS 215																					
<input checked="" type="checkbox"/>	Enforced Prerequisite (254 char) [MATH 116 or 121 or 156] and [ENGR 101 or 151 or EECS 183 or 280] and [Co-requisite: PHYSICS 240 or 260]; (C or better, No OP/F) Minimum grade requirement: C	Enforced Prerequisite (254 char) (MATH 116 or 121 or 156) and (ENGR 101 or 151 or EECS 180 or 183 or preceded or accompanied by EECS 280) and Co-requisite: PHYSICS 240 or 260; (C or better, No OP/F) Minimum grade requirement: C																					
<input type="checkbox"/>	Credit Exclusions Cannot receive credit for EECS 314 and EECS 215	Credit Exclusions Cannot receive credit for EECS 314 and EECS 215																					
<input checked="" type="checkbox"/>	<table border="0"> <tr> <td>Course Components</td> <td>Graded Component</td> <td>Terms Typically Offered</td> </tr> <tr> <td><input checked="" type="checkbox"/> Lecture</td> <td><input checked="" type="checkbox"/></td> <td><input checked="" type="checkbox"/> Fall</td> </tr> <tr> <td><input type="checkbox"/> Seminar</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/> Winter</td> </tr> <tr> <td><input checked="" type="checkbox"/> Recitation</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/> Spring</td> </tr> <tr> <td><input checked="" type="checkbox"/> Lab</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/> Summer</td> </tr> <tr> <td><input checked="" type="checkbox"/> Discussion</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/> Spring/Summer</td> </tr> <tr> <td><input type="checkbox"/> Independent Study</td> <td><input type="checkbox"/></td> <td></td> </tr> </table>	Course Components	Graded Component	Terms Typically Offered	<input checked="" type="checkbox"/> Lecture	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Fall	<input type="checkbox"/> Seminar	<input type="checkbox"/>	<input checked="" type="checkbox"/> Winter	<input checked="" type="checkbox"/> Recitation	<input type="checkbox"/>	<input type="checkbox"/> Spring	<input checked="" type="checkbox"/> Lab	<input type="checkbox"/>	<input type="checkbox"/> Summer	<input checked="" type="checkbox"/> Discussion	<input type="checkbox"/>	<input type="checkbox"/> Spring/Summer	<input type="checkbox"/> Independent Study	<input type="checkbox"/>		
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Cognizant Faculty Member Name: Jamie Phillips		Cognizant Faculty Member Title:																					

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

Contact Person:

Email:

Phone:

Punam Vyas

vyas@umich.edu

647-1754

Curriculum Committee Member:

Print:

Date:

Curriculum Committee Chair:

Print:

Date:

Home Department Chair:

Stephane Lafortune

Print:

Stephane Lafortune

Date: 3/20/2020

Cross-Listed Department Chair:

Print:

Date:

Cross-Listed Department Chair:

Print:

Date:

Cross-Listed Department Chair:

Print:

Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:**Requested:**Course Description

Introduction to electronic circuits. Basic Concepts of voltage and current; Kirchhoff's voltage and current laws; Ohm's law; voltage and current sources; Thevenin and Norton equivalent circuits; DC and low frequency active circuits using operational amplifiers, diodes, and transistors; small signal analysis; energy and power. Time- and frequency-domain analysis of RLC circuits. Basic passive and active electronic filters. Laboratory experience with electrical signals and circuits.

Course Description

Introduction to electronic circuits. Basic Concepts of voltage and current; Kirchhoff's voltage and current laws; Ohm's law; voltage and current sources; Thevenin and Norton equivalent circuits; DC and low frequency active circuits using operational amplifiers, diodes, and transistors; small signal analysis; energy and power. Time- and frequency-domain analysis of RLC circuits. Basic passive and active electronic filters. Laboratory experience with electrical signals and circuits.

Class Length

Full term

Class Length

Full term

Contact hours (lecture):

3

Contact hours (lecture):

3

Contact hours (recitation)

1

Contact hours (recitation)

1

Contact hours (lab)

3

Contact hours (lab)

3

Additional Info:Submitted by:

Home dept

Describe how this course fits with the degree requirements:

Degree Requirement

ABET departmental program outcomes for undergraduate courses:

1,6

Special resources of facilities required for this course:

The existing EECS laboratory supporting the current version of EECS 215 will continue to be needed. No additional special facilities are needed (student access to CAEN is assumed, some Matlab use).

Supporting statement:

The College of Engineering now accepts credit for the Computer Science AP exam. A score of 5 on the Computer Science A exam will qualify the student for EECS 180 credit (4 credits). A student with EECS 180 credit would then be allowed registered directly for EECS 280 without taking Engr 101, 151 or EECS 183. By making this change, students will be able to register for the course at the same time as other students who meet the programming requirements.



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CHECK APPROPRIATE BOXES FOR ALL CHANGES

Action Requested

- New Course Date of Submission: 2020-03-17
 Modification of Existing Course Effective Term: Winter 2021
 Deletion of Existing Course

<input checked="" type="checkbox"/>	Course Offered <input checked="" type="checkbox"/> Indefinitely <input type="checkbox"/> One term only	RO USE ONLY Date Received: Date Completed: Completed By:
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CURRENT LISTING

REQUESTED LISTING

<input checked="" type="checkbox"/>	Dept (Home):			Dept (Home): Mechanical Engineering		
	Subject:			Subject: MECHENG		
	Catalog:			Catalog: 570		
	<input type="checkbox"/> Course is Cross-Listed with Other Departments					
<input type="checkbox"/>	Department	Subject	Catalog Number	Department	Subject	Catalog Number
	Course Title (full title)			Course Title (full title) Fundamentals of Defects in Materials and Applications of Atomistic Modeling		
	Abbreviated Title (20 char)			Abbreviated Title (20 char) Modeling on Defects		
<input checked="" type="checkbox"/>	Course Description (Please limit to 50 words and attach separate sheet if necessary) This course introduces the correlation between various types of microstructural defects and materials' macroscopic phenomena, such as diffusion, deformation, radiation response, phase transformations, etc. Fundamentals of atomistic modeling and demo applications are also introduced to help students build better intuition about defects' structures and behaviors.					
<input checked="" type="checkbox"/>	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:	
<input checked="" type="checkbox"/>	Course Credit Type Rackham Graduate Student					
<input type="checkbox"/>	Repeatability <input type="checkbox"/> Course is Repeatable for Credit <input type="checkbox"/> Course is Y graded Maximum number of repeatable credits: <input type="checkbox"/> Can be taken more than once in the same term					

	Subject: Catalog:		
<input checked="" type="checkbox"/>	Grading Basis <input checked="" type="checkbox"/> Graded (A- E) <input type="checkbox"/> Credit/No Credit <input type="checkbox"/> Satisfactory/Unsatisfactory <input type="checkbox"/> Pass/Fail <input type="checkbox"/> Business Administration Grading <input type="checkbox"/> Not for Credit <input type="checkbox"/> Not for Degree Credit <input type="checkbox"/> Degree Credit Only	Add Consent <input type="checkbox"/> Department Consent <input type="checkbox"/> Instructor Consent <input checked="" type="checkbox"/> No Consent	Drop Consent <input type="checkbox"/> Department Consent <input type="checkbox"/> Instructor Consent <input checked="" type="checkbox"/> No Consent

	CURRENT LISTING	REQUESTED LISTING
<input checked="" type="checkbox"/>	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char) MECHENG 235; MECHENG 382
<input checked="" type="checkbox"/>	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement: C
<input type="checkbox"/>	Credit Exclusions	Credit Exclusions
<input checked="" type="checkbox"/>	Course Components <input checked="" type="checkbox"/> Lecture <input type="checkbox"/> Seminar <input type="checkbox"/> Recitation <input type="checkbox"/> Lab <input type="checkbox"/> Discussion <input type="checkbox"/> Independent Study	Graded Component <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
		Terms Typically Offered <input checked="" type="checkbox"/> Fall <input type="checkbox"/> Winter <input type="checkbox"/> Spring <input type="checkbox"/> Summer <input type="checkbox"/> Spring/Summer
Cognizant Faculty Member Name: Yue Fan		Cognizant Faculty Member Title:

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

Contact Person: Tim Moore Email: mooretim@umich.edu Phone: 734-763-4277

Jwo Pan

Curriculum Committee Member: Print: Jwo Pan Date: 3/27/20

Curriculum Committee Chair: Print: Date:

Donald J Siegel

Home Department Chair: Print: Donald Siegel Date: 3/27/20

Cross-Listed Department Chair: Print: Date:

Home Department Chair: Print: Date:

 Cross-Listed Department Chair:

Print:

Date:

Cross-Listed Department Chair:

Print:

Date:

Cross-Listed Department Chair:

Print:

Date:

DEPARTMENTAL/COLLEGE USE ONLY

Current:**Requested:**Course Description

This course introduces the correlation between various types of microstructural defects and materials' macroscopic phenomena, such as diffusion, deformation, radiation response, phase transformations, etc. Fundamentals of atomistic modeling and demo applications are also introduced to help students build better intuition about defects' structures and behaviors.

Class LengthClass Length

Full term

Contact hours (lecture):Contact hours (lecture):

3

Contact hours (recitation)Contact hours (recitation)Contact hours (lab)Contact hours (lab)**Additional Info:**Submitted by:

Home dept

Describe how this course fits with the degree requirements:ABET departmental program outcomes for undergraduate courses:

Not ABET accredited

Special resources of facilities required for this course:Supporting statement:

The advent of large-scale computations, once a rare resource, have made powerful simulation methods readily accessible to almost everyone, which in turn is dramatically changing the way we think about simulations and materials research. A very wide range of physical structures and phenomena, previously regarded as intractable, are now becoming amenable to simulation and predictive analysis, which can uniquely complement the traditional methods of theory and experiments. Given this, having such a course routinely available to students is of importance. This course has been offered three times before as a temporary ME599 course, and it has received consistent enrollments and positive feedbacks from the students. In addition, many students from other departments in CoE (e.g. MSE, NERS, ChE and AeroE) have taken this course before. Therefore, converting it into a permanent course would be a rational way of moving forward and would be of broad interests to the entire CoE.

ME599-005: Defects in Materials and Fundamentals of Atomistic Modeling

(Fall 2019)

Instructor:Dr. Yue Fan (fanyue@umich.edu)

Assistant Professor of Mechanical Engineering

Office: 3476 G. G. Brown

Website: <https://sites.google.com/a/umich.edu/yuefan/pi-fan>**Course description:**

“Materials are like people: it is the defects that make them interesting”

–Sir Charles Frank

From dispersion-strengthened alloys to semiconductors, from radiation-resistant materials to fiber-optic sensors, the performances of many functional materials are largely controlled by the defects in the systems. In this course we examine different types of defects in crystalline solids, including the point defects (0-dimensional), the line defects (1-dimensional), the interfacial defects (2-dimensional), and volumetric defects (3-dimensional), respectively. We will focus on how these microstructural defects are related to the macroscale phenomena of the materials, such as diffusion, deformation, radiation response, phase transformations, *etc.* We will also examine the “hidden defects” in highly disordered materials such as glasses. Fundamentals of atomistic modeling, including both the algorithms and demo applications, will be introduced to help students build intuition concerning the defects structures and behaviors. In addition, to help students better correlate in-class knowledge with state-of-the-art research, some recently published high-impact research papers on defects will be introduced and discussed in the class.

Course objectives:

By the finish of this course students should be able to:

1. Understand the common lattice structures of crystalline solids and different types of topological defects inside, including the point, line, planar, and volumetric defects
2. Describe the defects kinetic and dynamic behaviors by applying thermodynamics theory and transition state theory
3. Build a “multiscaling” perspective that connect the behaviors of microstructural defects to the materials macroscopic mechanical performance
4. Get the basic sense on structural materials design strategy by controlling the defects
5. Utilize atomistic modeling software (e.g. LAMMPS) and visualization software (e.g. Atomeye) in order to build intuition on defects
6. Develop key research skill through the final project, where students will be equipped with the capability of identifying the problem, proposing the research plan, and evaluating the results

Grading:

Class participation	10%
Reading assignment	20%
Exams	40%
<ul style="list-style-type: none"> ▪ Take-home Mid-term I (20%) ▪ Take-home Mid-term II (20%) 	
Final Project	30%
<ul style="list-style-type: none"> ▪ project report (15%) ▪ in-class presentation (15%) 	

Reading assignment

A literature pool of research papers concerning the defects properties will be provided by the instructor. Students can either choose one paper from the provided literature pool or select their own interested paper as the reading assignment. In the middle of the semester, each student will submit a short literature review report. The report has to be in scientific format, including the sections of Title, Abstract, Introduction, Method, Results, Discussion, and References.

Final project

During the course students will perform simple research projects related with defects behaviors in materials by utilizing the atomistic modeling software. Students may either propose their own research topic or can choose from a range of potential projects proposed by the instructor. Students are expected to assess the problem at hand, build a research plan, obtain some preliminary results, and draw the conclusions. The students also need to present to the class on their projects in about 10 minutes, and each presentation is followed by a 5-min Q&A interaction with the audience. At the end of the semester, students also need to submit a brief research report in scientific format. The aim of the research project is to enable a deeper level understanding with class materials, and to improve the research skills of the students.

Audience:

Graduate students and senior undergraduate students.

Lectures time:

Monday and Wednesday, 9:00—10:30 AM (1025 GGB)

Office hours:

By appointment with the instructor.

ME 599 SYLLABUS– FALL 2019
(SUBJECT TO CHANGE)

Lec. #	Date	Note	Topic
1	W-9/4		Introduction & overview
2	M-9/9		Atomic interaction and crystalline structure
3	W-9/11		Thermodynamics and point defects concentrations (0-D defect)
4	M-9/16		Defects diffusions, random walk model, and transition state theory
5	W-9/18		Fundamentals of molecular dynamics (MD) simulation
6	M-9/23	Beyster 1620B	Computer Lab-1 (static calculations)
7	W-9/25	Beyster 1620B	Computer Lab-2 (point defects diffusions)
8	M-9/30	Reading Abstract Due	Defects creations at normal and extreme environments
9	W-10/2		Limits of MD, fundamentals of Monte Carlo (MC) method
10	M-10/7		In-class paper review #1: point defects evolutions by MC method
11	W-10/9		Fundamentals of dislocations in materials (1-D defect)
FALL STUDY BREAK			
12	W-10/16		Time-dependent materials deformation (creep) due to 0-D and 1-D defects
13	M-10/21		Time-temperature-transformation (TTT) diagram, precipitate nucleation (3-D defect), and their influence on mechanical properties
14	W-10/23	Reading Assignments Due	Fundamentals of grain boundaries (2-D defect)
15	M-10/28	Beyster 1620B	Computer Lab-3 (dislocation systems)
16	W-10/30		Mid-term Exam I (take home)
17	M-11/4	Beyster 1620B	Computer Lab-4 (grain boundaries)
18	W-11/6	Exam Due	Guest lecture #1
19	M-11/11		In-class paper review #2: role of dislocations and their interactions with obstacles in materials performance
20	W-11/13		In-class paper review #3: GB's response under extreme conditions
21	M-11/18		Disordered materials, pair correlation function
22	W-11/20		Phenomenological models for amorphous materials
23	M-11/25		Potential energy landscape theory
24	W-11/27	Beyster 1620B	Computer Lab-5 (amorphous materials)
THANKSGIVING			
25	M-12/2		Guest lecture #2
26	W-12/4		Mid-term Exam II (take home)
27	M-12/9		Final Project Presentation #1
28	W-12/11	Exam Due	Final Project Presentation #2
	W-12/18	Final Project Due	

University of Michigan
 Fall 2019 Instructor Report With Comments
 MECHENG 599-005: Spec Topics in M E
 Yue Fan

14 out of 15 students responded to this evaluation.

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. (Q1631)	4	9	1	0	0	0	4.2	4.5	4.7
My interest in the subject has increased because of this course. (Q1632)	4	9	1	0	0	0	4.2	4.2	4.5
I knew what was expected of me in this course.(Q1633)	4	7	3	0	0	0	4.1	4.4	4.5
Overall, this was an excellent course.(Q1)	3	9	1	0	0	0	4.1	4.2	4.5
I had a strong desire to take this course.(Q4)	4	6	4	0	0	0	4.0	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) (Q891)	3	6	5	0	0	0	3.8	3.0	3.0

Responses to University-wide questions about the instructor:

	SA	A	N	D	SD	N/A	Your Median	University-Wide Median	School/College Median
Overall, Yue Fan was an excellent teacher.(Q2)	8	6	0	0	0	0	4.6	4.6	4.6
Yue Fan seemed well prepared for class meetings.(Q230)	12	2	0	0	0	0	4.9	4.8	4.8
Yue Fan explained material clearly.(Q199)	10	4	0	0	0	0	4.8	4.6	4.6
Yue Fan treated students with respect.(Q217)	12	2	0	0	0	0	4.9	4.8	4.9

The medians are calculated from Fall 2019 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.



Instructor with Comments Report

2018-04-04 - 2018-04-18 Report ID: MSR04734

Instructor: Fan, Yue
MECHENG 599 005

	Other Users of This Item*												
	Responses from your Students**						University Wide			School/College			
	5 SA	4 A	3 N	2 D	1 SD	NA	Your Median	75% Above	50% Above	25% Above	75% Above	50% Above	25% Above
4 I had a strong desire to take this course.	10	7	0	0	0	0	4.65	3.67	4.17	4.67	4.30	4.63	4.79
891 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).	7	3	5	2	0	0	4.00	2.83	3.12	3.46			
1631 This course advanced my understanding of the subject matter.	9	8	0	0	0	0	4.56	4.12	4.50	4.75			
1632 My interest in the subject has increased because of this course.	9	8	0	0	0	0	4.56	3.79	4.25	4.67			
1633 I knew what was expected of me in this course. (SA=Almost Always, A=Frequently, N=Sometimes, D=Occasionally, SD=Hardly Ever).	8	6	2	1	0	0	4.42	4.02	4.40	4.71			
230 The instructor seemed well prepared for class meetings. (SA=Almost Always, A=Frequently, N=Sometimes, D=Occasionally, SD=Hardly Ever)	14	3	0	0	0	0	4.89	4.52	4.81	4.93			
199 The instructor explained material clearly. (SA=Almost Always, A=Frequently, N=Sometimes, D=Occasionally, SD=Hardly Ever)	13	4	0	0	0	0	4.85	4.30	4.70	4.88			
217 The instructor treated students with respect.	15	2	0	0	0	0	4.93	4.68	4.87	4.95			
1 Overall, this was an excellent course.	11	6	0	0	0	0	4.73	3.90	4.33	4.75	4.17	4.50	4.75
2 Overall, the instructor was an excellent teacher.	13	4	0	0	0	0	4.85	4.38	4.75	4.92	4.40	4.71	4.88
3 I learned a great deal from this course.	10	7	0	0	0	0	4.65	4.00	4.40	4.75	4.20	4.52	4.79
122 I learned to apply principles from this course to new situations.	9	6	2	0	0	0	4.56	3.93	4.25	4.62			
140 I deepened my interest in the subject matter of this course.	10	7	0	0	0	0	4.65	3.99	4.31	4.67			
201 The instructor gave clear explanations.	13	3	0	0	0	0	4.88	4.25	4.67	4.86			
203 The instructor stressed important points in lectures/discussions.	13	3	0	0	0	0	4.88	4.42	4.74	4.88			
207 The instructor appeared to have a thorough knowledge of the subject.	14	2	0	0	0	0	4.93	4.69	4.87	4.95			
216 The instructor acknowledged all questions insofar as possible.	14	3	0	0	0	0	4.89	4.50	4.75	4.88			
219 The instructor was willing to meet and help students outside class.	14	3	0	0	0	0	4.89	4.50	4.79	4.92			
229 The instructor used class time well.	14	3	0	0	0	0	4.89	4.29	4.69	4.88			
232 Work requirements and grading system were clear from the beginning.	12	3	1	1	0	0	4.79	4.00	4.40	4.67			
239 The amount of work required was appropriate for the credit received.	8	7	1	1	0	0	4.43	3.90	4.17	4.52			
240 The amount of material covered in the course was reasonable.	8	8	0	0	0	0	4.50	4.00	4.33	4.61			
318 Writing assignments seemed carefully chosen.	9	7	1	0	0	0	4.56	3.83	4.17	4.56			
340 The textbook made a valuable contribution to the course.	7	2	2	0	0	6	4.71	3.28	4.00	4.50			
356 Examinations covered the important aspects of the course.	9	7	1	0	0	0	4.56	4.10	4.36	4.69			
365 Grades were assigned fairly and impartially.	10	5	0	0	0	2	4.75	4.00	4.33	4.70			

Written Comments

900 Comment on the quality of instruction in this course.

Student 1
Nice lecture. Clear teaching.



UNIVERSITY OF
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Fall 2018 Instructor Report With Comments for MECHENG 599-005: Spec Topics in M E (Yue Fan)

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

Course Audience: **16**
Responses Received: **11**
Response Ratio: **68.8%**

Report Comments

This report is a summary that tabulates all quantitative ratings on a single page. Results from the open-ended questions appear at the end of the report. Ratings are from the Fall 2018 teaching evaluations of MECHENG 599-005: Spec Topics in M E.

Prepared by: **Office of the Registrar**
Creation Date: **Wed, Jan 02, 2019**

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.	10	1	0	0	0	0	5.0	4.5	4.7
My interest in the subject has increased because of this course.	9	2	0	0	0	0	4.9	4.1	4.4
I knew what was expected of me in this course.	10	1	0	0	0	0	5.0	4.4	4.5
Overall, this was an excellent course.	9	2	0	0	0	0	4.9	4.2	4.5
I had a strong desire to take this course.	9	1	1	0	0	0	4.9	4.0	4.4
As compared with other courses of equal credit, the workload for this course was... (SA=Much Lighter to SD=Much Heavier)	1	0	7	3	0	0	2.9	3.0	3.0

Responses to the University-wide questions about the instructor:

	SA	A	N	D	SD	N/A	Your Median	University-Wide Median	School/College Median
Overall, Yue Fan was an excellent teacher.	11	0	0	0	0	0	5.0	4.5	4.6
Yue Fan seemed well prepared for class meetings.	11	0	0	0	0	0	5.0	4.8	4.7
Yue Fan explained material clearly.	11	0	0	0	0	0	5.0	4.6	4.6
Yue Fan treated students with respect.	11	0	0	0	0	0	5.0	4.8	4.8

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 16 to 74 in College of Engineering.

Written Comments

Comment on the quality of instruction in this course. (Q900)

Comments
One of the most prepared instructors I have seen so far. I understand it is most likely a research oriented course, however, I would like to suggest some additional homework (may be similar to lab or more small projects) to be included for the future.
Professor Fan is a great instructor and was always very well prepared in his lectures and labs. It was a pleasure to learn from him and I thought the work in the class was well paced with a very difficult initial take home exam and a second easier take home exam. I learned a great deal of useful information that I can take back to my research.
The only improvement the course could have had is more lab work and using the LAMMPS software. In specific, if we were given a more intense LAMMPS project as an assignment some time during the semester to help us understand how to play around with LAMMPS so by the time we do the final project we are already semi-fluent in our LAMMPS capabilities.
I learned a lot from this class Thanks!
Despite being relatively new at teaching, Prof. Fan is clearly gifted at explaining tricky concepts to students. It helps that his lectures were well paced, well organized, and he came prepared every course. The GSIs were good, but the quality of Prof. Fan's instruction made me wish he hosted the LAMMPS tutorials as well. Speaking of the software, I think that it is one of the core tools that student can draw from the course and apply to later projects. Therefore, I would recommend placing a greater emphasis on learning the software (I would say a 1/3rd of class sessions). This would really empower students to be more ambitious on final projects, and provide a comfort level for using LAMMPS on future projects. The first exam was definitely a challenge and I think it was a good idea to reduce the difficulty of the second exam so students could work on their projects concurrently. Overall, I had a good experience in the class.
This course is my first ME599 but I think it is better than the "Regular" level 500 courses that I have taken before. I learned a new software Lammps and I am interested to use it in my research area. Overall, Very Good Course!