

**UNIVERSITY OF MICHIGAN**  
**College of Engineering**  
**Curriculum Committee Meeting**  
**Tuesday, January 10, 2023**

**Attending:** Xiaogan Liang (Chair), Achilleas Anastasopoulos, Robert Bordley, Brent Gillespie, Saadet Guralp, George Halow (Zoom), Roman Hryciw, Odest Chadwicke Jenkins, Xianzhe Jia, Amir Kamil (Zoom), Leena Lalwani, Cameron Loutitt, Yulin Pan, Ken Powell, Eric Rutherford, Rachael Schmedlen, Katie Snyder, Roxanne Walker, Steven Yalisove, Won Sik Yang

**Support Staff:** Stacie Benison, Mercedes Carmona, Betsy Dodge

**Call to Order: 1:35pm**

**Adjourned: 1:55pm**

**AGENDA**

1. Approval of 12.6.2022 Meeting Minutes (Page 3) - APPROVED
2. Robotics SUGS Program Proposal – Action Item (Page 5) - APPROVED
  - a. The Robotics Undergraduate degree program currently has 58 declared undergraduate students in the program (19 seniors, 35 juniors, 5 sophomores). The Robotics Master's program has been active since 2015. This academic year, 91 students were admitted to the Robotics Master's program. Currently, there are 19 students enrolled in the Robotics Ph.D. program.
  - b. The minimum GPA required for admission to the Robotics SUGS Program will be a 3.5 and the program will begin by only accepting students who are in the Robotics Undergraduate program.
  - c. A question was asked regarding what scenario would constitute a student transferring in 3 credits, as mentioned in the proposal as an allowable option. For the Robotics SUGS program, the department wants a student to be able to transfer 3 credits away from their undergraduate degree to go towards their graduate degree program completion.
  - d. The Robotics SUGS Program will allow 9 credits to apply towards the master's requirements for double counting. It was also noted that interested students will be asked to apply for SUGS at the start of their senior year. All Robotics SUGS programs will have a Fall start, as the department does not plan to review applications more than once per year. If a student does not have enough credits to double-count graduate credit from their undergraduate degree enrollment, in order to complete the SUGS program, they will need to take graduate courses through their graduate enrollment to complete their degree program.
  - e. The Robotics proposal noted that 3 letters of recommendation would be required for application to the SUGS Program; AERO commented that Robotics may wish to consider lowering this number to help eliminate this additional barrier for students and since they have the minimum GPA in place for applicants. BME agreed with lowering the number of recommendations for the SUGS program. The Robotics Department will discuss this within their department and will consider revising proposal materials for submission to the CoE Faculty Meeting.
  - f. A suggestion was made for the Robotics Department to add to their website whether Undergraduate coursework can be taken while in the SUGS program.
  - g. The Robotics Department was advised to discuss the CCC's suggestions and comments within their department and may submit wish to submit revised proposal materials for submission to the CoE Faculty Meeting.
  - h. The CCC Chair called a vote to approve the Robotics SUGS Program proposal and the CCC members voted in its approval.

**CARF SUMMARIES**

<b>PAGE</b>	<b>SUBJECT</b>	<b>COURSE #</b>	<b>ACTION</b>	<b>SUMMARY</b>	<b>EFFECTIVE TERM</b>	<b>MIN. GRADE REQ. FOR ENF. PREPREQ</b>	<b>APPROVED</b>	<b>NOTES &amp; REVISIONS</b>	<b>TABLED</b>
11	AEROSP	500	DEL		FT 2023	NO	APPROVED		
14	AEROSP	650	NEW		FT 2023	NO	APPROVED		
27	AEROSP	656	NEW		FT 2023	NO	APPROVED		
39	AEROSP	690	NEW		FT 2023	NO	APPROVED		
53	MATSCIE	412	MOD	Change to Enforced Prerequisite.	FT 2023	C-	APPROVED	Cross-listed with CHE 412 & MARCOMOL 412.	
56	MATSCIE	440	MOD	Change to Enforced Prerequisite.	FT 2023	NO	APPROVED		
59	MATSCIE	465	MOD	Change to Enforced Prerequisite.	FT 2023	C-	APPROVED		
62	MECHENG	320	NEW		FT 2023	C	APPROVED	Cross-listed with NAVARCH 320.	
76	MECHENG	320	DEL		FT 2023	C	APPROVED		
79	NAVARCH	320	DEL		FT 2023	NO	APPROVED		
82	NAVARCH	321	MOD	Changes to Course Title, Abbreviated Title, Course Description, Full Term Credit Hours, Advisory Prerequisite	FT 2023	NO	APPROVED		

**UNIVERSITY OF MICHIGAN**  
**College of Engineering**  
**Curriculum Committee Meeting**  
**Tuesday, January 10, 2023**

**Attending:**

**Support Staff:**

**Call to Order:**

**Adjourned:**

**AGENDA**

1. Approval of 12.6.2022 Meeting Minutes (Page 3)
2. Robotics SUGS Program Proposal – Action Item (Page 5)

**CARF SUMMARIES**

<b>PAGE</b>	<b>SUBJECT</b>	<b>COURSE #</b>	<b>ACTION</b>	<b>SUMMARY</b>	<b>EFFECTIVE TERM</b>	<b>MIN. GRADE REQ. FOR ENF. PREPREQ</b>	<b>APPROVED</b>	<b>NOTES &amp; REVISIONS</b>	<b>TABLED</b>
11	AEROSP	500	DEL		FT 2023	NO			
14	AEROSP	650	NEW		FT 2023	NO			
27	AEROSP	656	NEW		FT 2023	NO			
39	AEROSP	690	NEW		FT 2023	NO			
53	MATSCIE	412	MOD	Change to Enforced Prerequisite.	FT 2023	C-		Cross-listed with CHE 412 & MARCOMOL 412.	
56	MATSCIE	440	MOD	Change to Enforced Prerequisite.	FT 2023	NO			
59	MATSCIE	465	MOD	Change to Enforced Prerequisite.	FT 2023	C-			
62	MECHENG	320	NEW		FT 2023	C		Cross-listed with NAVARCH 320.	

<b>76</b>	<b>MECHENG</b>	<b>320</b>	<b>DEL</b>		<b>FT 2023</b>	<b>C</b>			
<b>79</b>	<b>NAVARCH</b>	<b>320</b>	<b>DEL</b>		<b>FT 2023</b>	<b>NO</b>			
<b>82</b>	<b>NAVARCH</b>	<b>321</b>	<b>MOD</b>	Changes to Course Title, Abbreviated Title, Course Description, Full Term Credit Hours, Advisory Prerequisite	<b>FT 2023</b>	<b>NO</b>			

**UNIVERSITY OF MICHIGAN**  
**College of Engineering**  
**Curriculum Committee Meeting**  
**Tuesday, December 6, 2022**

**Attending:** Xiaogan Liang (Chair), Achilleas Anastasopoulos, Robert Bordley, Yavuz Bozer, Saadet Guralp, Odest Chadwicke Jenkins, Xianzhe Jia, Vineet Kamat, Amir Kamil, Leena Lalwani, Cameron Loutitt, Yulin Pan, Ken Powell, Krista Quinn, 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:** 2:17pm

**AGENDA**

1. Approval of 11.8.2022 Meeting Minutes (Page 2) – **APPROVED**
2. Steve Yalisove was wondering about the blanket agreement CoE has to accept all of LSA's minors and why this is not reciprocated by LSA to accept CoE minors.
3. Steve Yalisove raised the topic of students needing to take a gap year or time away from the university due to mental health or other unexpected circumstances. Steve discussed potential negative implications on students as a result of the policy in place that students have to reapply to the university after they have been away for over 1 year. The CCC plans to revisit a discussion of reviewing this and other related policies during a Winter 2023 CCC meeting.
  - a. After the meeting, the CoE Office of the Registrar staff confirmed with Tomika White from the CoE Scholastic Standing Committee further details on current policies surrounding Enrollment Withheld and Mandatory Leave. Students who are placed on Enrollment Withheld or Mandatory Leave can remain on that status indefinitely until they are ready to return to university. Their office and the Office of Recruitment and Admissions decided that the SSC reinstatement process (if approved) would also serve as a student's readmittance to the university.
4. The topic of retaining an I and W indicator on student transcripts was also raised by Steve Yalisove. It was proposed that it may be beneficial for the CCC to discuss the impact that removing an I or W from a student's Official Transcript may have.
  - a. A point was brought up that the university should maintain at least an internal mechanism to track any repeat attempts of courses, as some courses have limits on how many times a student is eligible to retake them. This can be done via the Unofficial Transcript.
  - b. A comment was made that discussions have been observed in online spaces regarding whether or not a student should late drop a class to earn a W grade or complete the course and receive the grade earned in the class.
  - c. An additional comment was made that the I or W indicators on a transcript may be useful information to a student's prospective employer to gain an understanding of the student's competency in certain topics or areas. A contrasting comment noted how it may not be the university's responsibility to assist prospective employers in sorting students based upon merit.
  - d. Vineet Kamat from the ADGPE Office mentioned that they have a new policy on incomplete grades specifically for independent study courses at the graduate level in CoE. CCC Support Staff will share any documentation received from Vineet on this policy widely with the CCC members.
  - e. The CCC plans to revisit this topic through any potential proposals during a Winter 2023 CCC meeting.
5. HLC Annual Audit Updates – The CoE Office of the Registrar team is working on completing the Project Charge for the CAEN Administrative Burden Group. We are hoping that the CoE Data Manager's Group in RPM can assist with reworking the Annual HLC Audit Report into a more digestible format for departments. Since this report has yet to be simplified, the report will not be sent to undergraduate and graduate department chairs for review for this Winter 2023 semester. Further updates on the timeline of the review process for departments will be shared when they are available.
  - a. CoE staff are working on benchmarking processes with other schools/colleges within the university to see what their processes are.

## CARF SUMMARIES

PAGE	SUBJECT	COURSE #	ACTION	SUMMARY	EFFECTIVE TERM	MIN. GRADE REQ. FOR ENF. PREPREQ	APPROVED	NOTES & REVISIONS	TABLED
4	EECS	403	MOD	Change to Enforced Prerequisite.	FT 2023	C	APPROVED		
7	EECS	456	NEW		FT 2023	C	CONDITIONAL APPROVAL	Revise Course Description to describe what is covered within the course rather than a discussion of the internet.  Note: This course will not count as an upper-level technical elective, course will serve as a flexible technical elective for ECE.	
16	MATSCIE	481	MOD	Change to Course Description adding CPT Project Language.	FT 2023	NO	APPROVED	Cross-listed with MFG 489.	
19	MATSCIE	482	MOD	Change to Course Description adding CPT Project Language.	FT 2023	NO	APPROVED	Cross-listed with MFG 480.	
22	MATSCIE	518	NEW		FT 2023	NO	CONDITIONAL APPROVAL	Edit Course Description to “Provides an insight” and remove the last comma after “as well as”	

To: College Curriculum Committee  
From: Dawn Tilbury, Department Chair of Robotics  
Date: December 20, 2022  
Re: Robotics SUGS Proposal

Dear College Curriculum Committee,

I am happy to submit this letter of support for the proposed request to establish a Sequential Undergraduate/Graduate Studies (SUGS) program in the Department of Robotics. Participating students will be able to earn their Bachelors of Science in Robotics and a Master's degree in Robotics upon completion of five years of study.

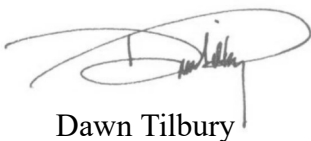
The graduate program in Robotics has been in place since Fall 2014, and has grown a lot since then. In Fall 2022, we welcomed 91 students into the MS program and 18 (including 1 Bridge student) into the PhD program. While the number of undergraduate students currently enrolled in Robotics is small (we are just finishing the inaugural semester of the undergraduate program), that number is rapidly growing and we expect it to continue to do so.

This new Robotics SUGS program will allow students to double count a maximum of 9 credits from their Bachelor's degree towards a 30 credit Master's degree. In addition, a SUGS student may transfer a maximum of 3 credits to their graduate degree, so long as those transfer credits were not used for their undergraduate degree. This leaves 18-21 credits required to complete their Masters, which can be accomplished in one year with two semesters of graduate coursework.

The plan for Academic Year F23/W24 is for this SUGS option to be available only to undergraduate students in the Robotics Department. In the future, we will engage with other departments across the College of Engineering to support eventual expansion to future students beyond Robotics undergraduates.

I believe the SUGS program could be a valuable tool in growing the diversity in our MS program and I am excited to see that happen.

Best,



Dawn Tilbury  
Professor and Ron and Regina McNeil Chair of Robotics  
Herrick Professor of Engineering  
Professor of Mechanical Engineering and Electrical Engineering (by courtesy)

December 19, 2022

Dear Colleagues;

On behalf of Michigan Engineering and as Associate Dean for Graduate and Professional Education, I am pleased to submit this letter of support for the proposed request to establish a Sequential Undergraduate/Graduate Studies (SUGS) program in the Department of Robotics.

SUGS programs offer our most promising students the opportunity to complete Master's degree requirements as part of a seamless program combined with their undergraduate study at Michigan Engineering. Participating students will earn their Bachelors of Science in Robotics and a Master's degree in Robotics upon completion of five years of study.

In Academic Year F23/W24, this SUGS option will be made available only to undergraduate students in the Robotics Department while seeking agreements from other departments across the College of Engineering to support eventual expansion to future students beyond Robotics.

While the number of undergraduate students currently enrolled in Robotics is small it is rapidly growing. The graduate program in Robotics has been in place since Fall 2014, and has grown to a healthy size. In Fall 2022, we welcomed 91 students into the MS program and 18 (including 1 Bridge student) into the PhD program. We are hoping to grow the diversity in our MS program. A SUGS program such as this one can be a valuable tool toward achieving that important and timely goal.

This new Robotics SUGS program will allow students to double count a maximum of 9 credits from their Bachelor's degree towards a 30 credit Master's degree. In addition, a SUGS student may transfer a maximum of 3 credits to their graduate degree, so long as those transfer credits were not used for their undergraduate degree. This leaves 18-21 credits required to complete their Masters, which can be accomplished in one year with two semesters of graduate coursework.

Students will be encouraged to indicate their interest in the SUGS program with the Robotics graduate program office during their junior year and will apply to the SUGS program early in their senior year. They will only accept applications for matriculation into the Robotics MS program in the Fall.

I look forward to the success of this exciting new program.

Sincerely,



Lola Eniola-Adefeso, Ph.D. (Fellow of AIMBE, BMES)  
Associate Dean for Graduate & Professional Education  
University Diversity and Social Transformation Professor of Chemical Engineering;  
Biomedical Engineering; Macromolecular Science and Engineering  
Director, Cell Adhesion and Drug Delivery Lab  
Associate Director, NIH Cellular Biotechnology Training Grant  
Deputy Editor for Science Advance



## Sequential Undergraduate/Graduate Study (SUGS)

The Rackham SUGS program was developed to promote greater enrollment of qualified College of Engineering (CoE) students in the MS program by making it possible for students to pursue a five-year combined BSE/MS. The Robotics department will accept SUGS applications from undergraduates in the Robotics department.

The Robotics SUGS program allows students to *double count* a maximum of 9 credits from their Bachelor's degree at U of M Ann Arbor towards a 30 credit Master's degree at U of M Ann Arbor. These 9 double counted credits can come from graduate level technical electives, advanced math, and/or general electives taken to satisfy the undergraduate degree requirements. In addition, a SUGS student may *transfer* a maximum of 3 credits to their graduate degree. These transfer credits cannot be used for any portion of their undergraduate degree.

In short, students admitted to the Robotics SUGS program have the opportunity to bring 9-12 credits taken during their undergraduate degree into their 30 credit graduate degree. This leaves 18-21 credits required to complete their Masters, which can be accomplished in one year with two semesters of graduate coursework.

## Admission Guidelines for the SUGS Program in Robotics

- At the **end** of their **junior** year, students must meet with a Robotics Department advisor to file an intent to apply form for the Robotics SUGS program. The student will then work with the advisor to outline a preliminary study plan to make the appropriate course selections. SUGS students do not dual register.
- **Minimum cumulative GPA requirement: 3.5.** This minimum GPA is required at the time of filling out the intent form as well as the completion of the Bachelor's degree.
- After the intent to apply form has been completed and accepted, **the student must apply for SUGS during their senior year by completing a Rackham graduate application.** See below for information on the application process.
- The SUGS program is only available to students receiving their undergraduate and graduate degrees at the University of Michigan Ann Arbor campus.
- **Robotics SUGS students may pursue the standard coursework-based Masters that is described here:**  
<https://robotics.umich.edu/academics/graduate/degree-requirements/> .
- Rackham will accept a **maximum of 9 credits to be double counted** between the undergraduate and graduate degrees, even if the credit for specific courses to be double counted adds to more than 9 credit hours. However, the balance of the credit remaining

after 9 hours are double counted cannot be counted toward any other Rackham degree requirement. For example, suppose a student wants to double count 3 courses and the total credits for the 3 courses equals 10. Rackham will double count the maximum of 9. The 1 remaining credit cannot count toward another Rackham degree requirement but can count toward an undergraduate degree requirement. The double counted courses will appear on the undergraduate transcript. **Double counted credits can only come from graduate level technical electives, advanced math, and/or general electives.**

- The Robotics department will allow a **maximum of 3 credits to be transferred** into the Rackham graduate degree, in addition to the 9 double counted credits. These transfer credits cannot be used for any portion of the undergraduate degree. The transfer credit will appear on the graduate transcript.
- A Robotics SUGS student may bring a **maximum of 12** total double counted and transferred credits into Rackham.
- All double counted and transfer courses must have grades of "**B**" or **above** and be able to fit into the MS (Robotics) degree audit.
- SUGS students must enroll in Rackham for a **minimum of two full terms** (at least 9 credits per term), **paying full Rackham tuition**.
- No deferment allowed. **Robotics SUGS students must enroll in Rackham immediately upon completion of their undergraduate degree.** In a few instances students may have up to 6 credits of the undergraduate program outstanding upon enrollment in Rackham in accordance with Rackham rules. The undergraduate degree can be awarded as soon as the degree requirements are met. If there are medical/personal/etc. reasons for deferment, a student may submit a petition to the Robotics department.
- The SUGS program is not available for students pursuing a dual-degree in either their undergraduate or graduate program.
- Should a SUGS student seek admission to a Ph.D. program, the standard criteria and application materials would be required.

## Financial Assistance

- **Research Assistantships:** SUGS students are encouraged to contact faculty with similar research interests during their senior year. Information about the research interest areas of Robotics faculty members may be found here: <https://robotics.umich.edu/research/focus-areas/>.
- **GSI Positions:** These highly competitive graduate student positions are available for application for fall and winter terms. Applications are generally accepted in March for the Fall term and October for the Winter term. Domestic students are eligible to apply for GSI positions beginning their first term of enrollment. International students who

have passed the UM Oral English Test are eligible to apply beginning their second term. In general, the order of preference for GSI positions from highest to lowest is Ph.D. students, full-time Masters students, then SUGS students.

## How to Apply

The Horace H. Rackham School of Graduate Studies at the University of Michigan regulates all graduate admissions, and the application for admission will therefore technically be made to Rackham. The ROB Department will review all application materials and make admission recommendations, following which, Rackham will officially confirm this decision. For detailed information on Rackham's minimum admissions criteria and application procedures, please visit: [http://www.rackham.umich.edu/admissions/prospective\\_students\\_degree/](http://www.rackham.umich.edu/admissions/prospective_students_degree/).

## Application Requirements

### Application Deadlines

- **Fall Term:** January 15th

### Rackham Application Fee:

- U.S. Citizens and Permanent Residents: \$75
- Non-Residents: \$90

### Submit the Online Application to Rackham:

- **Online application:**
  - The online application can be found at:  
[http://www.rackham.umich.edu/admissions/prospective\\_students\\_degree/appl...](http://www.rackham.umich.edu/admissions/prospective_students_degree/appl...)
  - Applicants are required to create an Apply-Web account before filling out the online application.
  - Please adhere to the application deadlines when applying to the program.
- **3 Letters of Recommendation:** The electronic submission of recommendation letters is required. Two of the three letters must come from university professors.
- **Statement of Purpose (SOP):** The Statement of Purpose (SOP) should be a concise, well written statement about an applicant's academic and research background, career goals,

and how this graduate program will help meet career and educational objectives.

- **Personal Statement (PS):** The Personal Statement (PS) is an essay about how an applicant's background and life experiences, including cultural, geographical, financial, and educational or other opportunities or challenges, motivated the decision to pursue a graduate degree at the University of Michigan. For example, if an applicant grew up in a community where educational, cultural, or other opportunities were either especially plentiful or especially lacking, they might discuss the impact this had on their development and interests. This should be a discussion of the journey that has led to the decision to seek a graduate degree.
- **Curriculum Vitae (CV/Resume)**
- **Scientific/technical writing publications/sample (optional):** Applicants are encouraged to submit up to two publications that have been accepted by reputable peer-reviewed journals. Please note: if more than two writing samples are submitted, none shall be reviewed. These submissions are used to assist the department to match student and faculty interests and will not be a dominant factor in admission decisions.

### **Submit Research Interest Form to Robotics Department:**

- An e-mail notification will be sent from ROB to applicants 1-3 weeks after the submission of the online application. The requested information should be filled out in order to avoid any delays in the application processing.

### **Mail Official Transcripts to Rackham:**

- UM Ann Arbor students need not submit a transcript to Rackham.
- Rackham does not accept transcripts from study abroad programs, junior, community, or non-degree colleges.
- ROB does **not** accept scanned uploaded transcripts. Please do not upload any transcripts along with the application.
- Cumulative GPA must be 3.5 or better in order to apply to the SUGS program.

### **Admission Decisions**

- **Fall Terms:** Admission decisions are made beginning mid-February through March.



## 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: 2022-12-14

Effective Term: Fall 2023

<input checked="" type="checkbox"/>	Course Offered	<b>DO NOT USE ONLY</b> Date Received: Date Completed: Completed By:
	<input checked="" type="checkbox"/> Indefinitely <input type="checkbox"/> One term only	

#### CURRENT LISTING

#### REQUESTED LISTING

<input type="checkbox"/>	Dept (Home): Aerospace Engineering Subject: AEROSP Catalog: 500			Dept (Home): Subject: Catalog:		
<input type="checkbox"/>	<input type="checkbox"/> Course is Cross-Listed with Other Departments			<input type="checkbox"/> Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
<input type="checkbox"/>						
<input type="checkbox"/>	Course Title (full title) AEROSPACE ENTERPRISE LEADERSHIP			Course Title (full title)		
<input type="checkbox"/>	Abbreviated Title (20 char) AERO ENTRP LDRSHP			Abbreviated Title (20 char)		
<input type="checkbox"/>	Course Description (Please limit to 50 words and attach separate sheet if necessary) Leadership and business skills essential to leading and managing large technical teams and operations, with a focus on the Aerospace Enterprise. Numerous seminars and invited speakers include senior leaders and notable practitioners from industry, government, and academia.					
<input type="checkbox"/>	Full Term Credit Hours			Half Term Credit Hours		
	Undergraduate Min:	Graduate Min: 1.5		Undergraduate Min:	Graduate Min:	
<input type="checkbox"/>	Undergraduate Max:			Undergraduate Max:		
	Graduate Max: 1.5			Graduate Max:		
<input type="checkbox"/>	Course Credit Type Rackham Graduate Student, Non-Rackham Graduate Student					
<input type="checkbox"/>	Repeatability <input type="checkbox"/> Course is Repeatable for Credit					
	Maximum number of repeatable credits:			<input checked="" type="checkbox"/> Course is Y graded <input type="checkbox"/> Can be taken more than once in the same term		

Subject: Aerospace Engineering      Catalog: 500		
<input type="checkbox"/>	<b>Grading Basis</b> <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 <b>Grading</b> <input type="checkbox"/> Not for Credit <input type="checkbox"/> Not for Degree Credit <input type="checkbox"/> Degree Credit Only	<div style="display: flex; justify-content: space-between;"> <div> <b>Add Consent</b>  <input type="checkbox"/> Department Consent  <input type="checkbox"/> Instructor Consent  <input checked="" type="checkbox"/> No Consent         </div> <div> <b>Drop Consent</b>  <input type="checkbox"/> Department Consent  <input type="checkbox"/> Instructor Consent  <input checked="" type="checkbox"/> No Consent         </div> </div>

	CURRENT LISTING	REQUESTED LISTING
<input type="checkbox"/>	Advisory Prerequisite (254 char) None	Advisory Prerequisite (254 char)
<input type="checkbox"/>	Enforced Prerequisite (254 char) None Minimum grade requirement:	Enforced Prerequisite (254 char)  Minimum grade requirement:
<input type="checkbox"/>	Credit Exclusions	Credit Exclusions
<input type="checkbox"/>	<div style="display: flex;"> <div style="flex: 1;"> <b>Course Components</b>  <input checked="" type="checkbox"/> Lecture  <input type="checkbox"/> Seminar  <input checked="" type="checkbox"/> Recitation  <input type="checkbox"/> Lab  <input type="checkbox"/> Discussion  <input type="checkbox"/> Independent Study         </div> <div style="flex: 1;"> <b>Graded Component</b>  <input checked="" type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/> </div> </div>	<b>Terms Typically Offered</b> <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: George Halow      Cognizant Faculty Member Title: Professor of Practice		

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

Contact Person: Liza Roberts      Email: lizatate@umich.edu      Phone: (734) 936-0108

CoE Curriculum

Committee Representative:       Print: Kenneth G Powell      Date: 12/19/22

CoE Curriculum Committee Chair:       Print:      Date:

Home Department Chair:       Print: ANTHONY WAAS      Date: 12/20/22

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

Leadership and business skills essential to leading and managing large technical teams and operations, with a focus on the Aerospace Enterprise. Numerous seminars and invited speakers include senior leaders and notable practitioners from industry, government, and academia.

Course DescriptionClass Length

Full term

Class LengthContact hours (lecture):

1.5

Contact hours (lecture):Contact hours (recitation)

1.5

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

Home dept

Describe how this course fits with the degree requirements:

Prepare students for future senior leadership in the Aerospace enterprise by developing deep knowledge and expertise in 'essential business skills' required to effectively lead large and complex technical operations.

Special resources of facilities required for this course:

None

Supporting statement:

The Global Aerospace Leadership MEng course numbering scheme has been adjusted to better align with ADGPE and departmental recommendations to use 600-level courses for this online master's program. AEROSP 500 has never been offered. A New CARF Submission reflects the new course number, AEROSP 650, for this course that will first be offered in Fall 2023 as a required course for the first cohort of Global Aerospace Leadership MEng students.



# Course Approval Request Form

Office of the Registrar, University of Michigan

1210 ISA 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: 2022-12-15

Effective Term: Fall 2023

<input checked="" type="checkbox"/>	Course Offered	<b>DO NOT USE ONLY</b> Date Received: Date Completed: Completed By:
	<input checked="" type="checkbox"/> Indefinitely <input type="checkbox"/> One term only	

### CURRENT LISTING

### REQUESTED LISTING

<input checked="" type="checkbox"/>	Dept (Home): Subject: Catalog:			Dept (Home): Aerospace Engineering Subject: AEROSP Catalog: 650		
<input type="checkbox"/>	<input type="checkbox"/> Course is Cross-Listed with Other Departments			<input type="checkbox"/> Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
<input checked="" type="checkbox"/>	Course Title (full title)			Course Title (full title) Aerospace Enterprise Leadership		
<input checked="" type="checkbox"/>	Abbreviated Title (20 char)			Abbreviated Title (20 char) Aero Enterprise Lead		
<input checked="" type="checkbox"/>	Course Description (Please limit to 50 words and attach separate sheet if necessary) Leadership, strategic technology, and critical business skills essential to leading and managing large technical teams and operations, with a focus on the Aerospace Enterprise. Provides teachings and coaching on role-model leadership behaviors through instructor lectures, case study analyses, and thoughts and perspectives from senior leaders in industry, government, and academia.					
<input checked="" type="checkbox"/>	Full Term Credit Hours Undergraduate Min: Graduate Min: 1.5 Undergraduate Max: Graduate Max: 1.5			Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:		
<input checked="" type="checkbox"/>	Course Credit Type Non-Rackham Graduate Student					
<input type="checkbox"/>	Repeatability <input type="checkbox"/> Course is Repeatable for Credit Maximum number of repeatable credits: <input type="checkbox"/> Course is Y graded <input type="checkbox"/> Can be taken more than once in the same term					



	Subject:      Catalog:		
<input checked="" type="checkbox"/>	<b>Grading Basis</b> <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 <b>Grading</b> <input type="checkbox"/> Not for Credit <input type="checkbox"/> Not for Degree Credit <input type="checkbox"/> Degree Credit Only	<b>Add Consent</b> <input type="checkbox"/> Department Consent <input type="checkbox"/> Instructor Consent <input checked="" type="checkbox"/> No Consent	<b>Drop Consent</b> <input type="checkbox"/> Department Consent <input type="checkbox"/> Instructor Consent <input checked="" type="checkbox"/> No Consent

	CURRENT LISTING	REQUESTED LISTING
<input type="checkbox"/>	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
<input checked="" type="checkbox"/>	Enforced Prerequisite (254 char)  Minimum grade requirement:	Enforced Prerequisite (254 char) Declaration in MEng program in Global Aerospace Leadership Minimum grade requirement:
<input type="checkbox"/>	Credit Exclusions	Credit Exclusions
<input checked="" type="checkbox"/>	<b>Course Components</b> <input checked="" type="checkbox"/> Lecture <input checked="" type="checkbox"/> Seminar <input type="checkbox"/> Recitation <input type="checkbox"/> Lab <input type="checkbox"/> Discussion <input type="checkbox"/> Independent Study	<b>Graded Component</b> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	<b>Terms Typically Offered</b> <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: George Halow      Cognizant Faculty Member Title: Professor of Practice		

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

Contact Person:      Liza Roberts      Email:      lizatate@umich.edu      Phone:      (734) 936-0108

CoE Curriculum

Committee Representative:       Print: Kenneth G Powell      Date: 12/19/22

CoE Curriculum Committee Chair:      Print:      Date:

Home Department Chair:       Print: ANTHONY WAAS      Date: 12/20/2022

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 DescriptionCourse Description

Leadership, strategic technology, and critical business skills essential to leading and managing large technical teams and operations, with a focus on the Aerospace Enterprise. Provides teachings and coaching on role-model leadership behaviors through instructor lectures, case study analyses, and thoughts and perspectives from senior leaders in industry, government, and academia.

Class LengthClass Length

Full term

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

1.5

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:

Required course for all students in the online Global Aerospace Leadership MEng program

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

This course is a required course for the new online Master of Engineering in Global Aerospace Leadership program (Aerospace Engineering department).

# Aerospace Enterprise Leadership

## AEROSP 650 – Fall 2023 – 1.5 Credits

University of Michigan, Course Syllabus

### Syllabus Outline

- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>• <a href="#">Instructor and GSI Information</a></li><li>• <a href="#">Program and Technical Support</a></li><li>• <a href="#">Course Description</a></li><li>• <a href="#">Learning Objectives</a></li><li>• <a href="#">Course Needs and General Overview</a></li><li>• <a href="#">Participation and Communication</a></li></ul> | <ul style="list-style-type: none"><li>• <a href="#">Course Schedule</a></li><li>• <a href="#">Assignment/Task Submission Details</a></li><li>• <a href="#">Course Guidelines</a></li><li>• <a href="#">Grading Overview</a></li><li>• <a href="#">Policy Statements and Student Support Resources</a></li></ul> |
|---|---|

### Instructor and GSI Information

#### Faculty Information

Name: [George Halow](#)

Contact Info: Please message me directly within our course Canvas site.

#### Office Hours on Zoom

- Faculty office hours are Mondays and Tuesdays from 11am to 12:00 noon Eastern Time.
- Additional office hours by appointment.

## Program and Technical Support

### For Program Support

To get help related to enrollment, advising, and program items, please contact the Global Aerospace Leadership Program Coordinator, Liza Roberts ([lizatate@umich.edu](mailto:lizatate@umich.edu)).

### For Course Technical Support

For questions or issues with Canvas, contact the Nexus Design Team [nexusdesign@umich.edu](mailto:nexusdesign@umich.edu)

## Course Description

A graduate level course in leadership, strategic technology, and critical business skills essential to leading and managing large technical teams and operations, with a focus on the Aerospace Enterprise. The course provides teachings and coaching on role model leadership behaviors through instructor lectures, case study analyses, and thoughts and perspectives from senior leaders in industry, government, and academia.

## Learning Objectives

- Apply technologies adeptly for business competitive advantage across the entire product development value stream.
- Model ethics and integrity throughout actions and decisions.
- Create organizational policies within a framework of ethics, integrity, and transparency as core foundational values.
- Demonstrate knowledge of responsible social and environmental business practices.
- Analyze global value stream and supply chain risks and opportunities to ensure strong business decisions based upon findings.

## Course Needs and General Overview

### Course Textbook & Materials

- Multiple case studies on business issues ranging from technology & product development, management of large organizations, sustainability, and management of diverse, multi-cultural teams. These include: Searching for Value, Tesla Motors, Better Place, Ethics & Integrity in Business (B, C, D), Intel Sourcing, Southwest Airlines, Takata, Tata Nano, Concorde, and SpaceX. The cases are found in Canvas in the appropriate Module for the component of the course in which they are taught.

### Technology Requirements

For the program specifics please see the [full technology requirements](#).

### Course Format

Our lectures are available asynchronously (taped recordings). Weekly tasks include watching a series of lectures, reading the case(s), and performing the assignments – including write-ups, interaction with others in the course, and utilization of office hours as required.

## Course Schedule

Below is our general course schedule. Any updates or changes are in our course Canvas site.

Mod #	Topics and/or Readings	Assignments/Tasks	Task Date Given	Task Due Date
1	<ul style="list-style-type: none"> <li>• Halow intro</li> <li>• Syllabus review</li> <li>• Mauborgne Interview</li> <li>• Condit Interview</li> </ul>	<ul style="list-style-type: none"> <li>• Submit final Personal Leadership Commitment</li> <li>• Respond to peers' Personal Leadership Commitments</li> <li>• Update</li> </ul>	9/4/23	9/10/23
2	<ul style="list-style-type: none"> <li>• Practical Technologists (PT) Overview</li> </ul>	<ul style="list-style-type: none"> <li>• Intro to PT Activity</li> </ul>	9/11/23	9/17/23
3	<ul style="list-style-type: none"> <li>• PT continued</li> <li>• Searching for Value</li> </ul>	<ul style="list-style-type: none"> <li>• Read Searching for Value case</li> <li>• Answer reflection questions from video lecture and case introduction</li> <li>• Participate in discussion board chat</li> </ul>	9/18/23	9/24/23
4	<ul style="list-style-type: none"> <li>• PT continued</li> </ul>	<ul style="list-style-type: none"> <li>• Read Tesla Motors, watch short videos, answer reflection questions</li> <li>• Read Better Place &amp; answer reflection questions</li> <li>• Activity 3</li> </ul>	9/25/23	10/1/23
5	<ul style="list-style-type: none"> <li>• PT conclusion</li> <li>• Atalla Lecture</li> <li>• Kortess Lecture</li> <li>• Halow Lecture</li> </ul>	<ul style="list-style-type: none"> <li>• Watch video lectures</li> <li>• Write essay on what you got from the lectures</li> <li>• Update your Personal Leadership Commitment</li> </ul>	10/2/23	10/8/23
6	<ul style="list-style-type: none"> <li>• Conscience-Drive Leaders (CDL) Overview</li> </ul>	<ul style="list-style-type: none"> <li>• Intro to CDL – read Ethics &amp; Integrity in Business mini-cases (C, D, E) and answer reflection questions. Provide perspectives in discussion board and provide comment/feedback to two others in the course</li> </ul>	10/9/23	10/15/23

Mod #	Topics and/or Readings	Assignments/Tasks	Task Date Given	Task Due Date
7	<ul style="list-style-type: none"> <li>• CDL continued</li> </ul>	<ul style="list-style-type: none"> <li>• Read Intel case &amp; answer reflection questions on “accountability”. Write short essay on “ethics of a company supply chain”</li> <li>• Read Southwest case &amp; answer reflection questions in the discussion board. Provide your company policy recommendation</li> </ul>	10/16/23	10/22/23
8	<ul style="list-style-type: none"> <li>• CDL continued</li> </ul>	<ul style="list-style-type: none"> <li>• Ted Talks &amp; Activity 1 &amp; 2 – reflect on the impact your personal experiences have had on your leadership brand, and provide perspectives on the value of diverse perspectives in cross-functional collaboration</li> </ul>	10/23/23	10/29/23
9	<ul style="list-style-type: none"> <li>• CDL continued</li> </ul>	<ul style="list-style-type: none"> <li>• Read The In-Box case, and answer questions given in the case</li> <li>• Read Takata case, and answer reflection questions. Write short essay on implications for safety and quality in the Aerospace (or any) industry</li> </ul>	10/30/23	11/5/23
10	<ul style="list-style-type: none"> <li>• CDL conclusion</li> <li>• Haverkamp Lecture</li> <li>• Meyer Lecture</li> </ul>	<ul style="list-style-type: none"> <li>• Watch video lectures</li> <li>• Write essay on what you got from the lectures</li> <li>• Update your Personal Leadership Commitment</li> </ul>	11/6/23	11/12/23
11	<ul style="list-style-type: none"> <li>• Collaborative Innovators (CI) Overview</li> </ul>	<ul style="list-style-type: none"> <li>• Pick a significant project you worked on in the past which had a positive outcome – list your perspectives about the project objectives &amp; scope,</li> </ul>	11/13/23	11/19/23

Mod #	Topics and/or Readings	Assignments/Tasks	Task Date Given	Task Due Date
		<p>team commitment, culture, and leadership</p> <ul style="list-style-type: none"> <li>• Pick another project you worked on which didn't fare as well and list same</li> <li>• Complete the Pugh matrix as outlined in Canvas, and submit</li> <li>• After the submission deadline, write some observations in the discussion board and read those from others. Respond where you saw consistencies, and differences</li> <li>• Then watch the instructional video</li> </ul>		
12	<ul style="list-style-type: none"> <li>• CI Continued</li> <li>• Tata Nano Video</li> </ul>	<ul style="list-style-type: none"> <li>• Read the Tata Nano case, and answer the reflection questions</li> <li>• Perform a stakeholder analysis and write a short brief on what Tata should've done differently with at least three key stakeholders</li> </ul>	11/20/23	11/26/23
13	<ul style="list-style-type: none"> <li>• CI Continued</li> <li>• Concorde Video</li> <li>• SpaceX case</li> </ul>	<ul style="list-style-type: none"> <li>• Read the Concorde case</li> <li>• Answer the three questions on innovation, collaboration, and strategic approaches to international collaborations and geopolitical interests</li> <li>• Read the SpaceX case and answer the reflection questions as outlined in the "Focus on Innovation" section of the assignment video</li> </ul>	11/27/23	12/3/23



Mod #	Topics and/or Readings	Assignments/Tasks	Task Date Given	Task Due Date
14	<ul style="list-style-type: none"> <li>• CI Conclusion</li> <li>• Fischer Lecture</li> <li>• Osborne Lecture</li> </ul>	<ul style="list-style-type: none"> <li>• Watch the guest lectures and write the short summary of what you gleaned from them</li> </ul>	12/4/23	12/10/23
15	<ul style="list-style-type: none"> <li>• Halow Conclusion</li> <li>• Condit Interview</li> </ul>	<ul style="list-style-type: none"> <li>• Watch the conclusion and interview videos</li> <li>• Write your essay on Well-Rounded and Role Model Leadership</li> <li>• Update your Personal Leadership Commitment and share in the discussion board</li> </ul>	12/11/23	12/17/23

Table 1: General outline of our modules, course topics/readings, assignments/tasks, date tasks are given, and date tasks are due.

## Assignment/Task Submission Details

Assignment submissions will be as outlined in Canvas. Generally:

- Reports, essays, and reflection question answers are to be submitted in PDF form, in Canvas by the date specified
- Discussion board and Slack tools will be made available for other interactions
- Assignment rubrics will be created for all assignments. High-level rubric/expectations will be outlined in Canvas (point values for sections, etc)

## Course Guidelines

- Late work will receive a 5% penalty per day, up to 25% penalty, unless other accommodations are approved by the instructor

## Grading Overview

Coursework will be graded per the following breakdown.

Assignments/Tasks	Points	% Of Grade
Reflection questions on cases	180	47.4
Essays	100	26.3
Collaborative Innovators reflection – Pugh Matrix	25	6.6
Personal Leadership Commitment Updates	50	13.2
Class participation/discussion boards	25	6.6

Table 2: Overview with points for each assignment/task and percentage of that item to the total grade.

## Expected Grading Scale

In our course, grades are calculated by...

- A+ = 97-100
- A = 93-96
- A- = 90-92
- B+ = 87-89
- B = 83-86
- B- = 80-82
- C+ = 77-79
- C = 73-76
- C- = 70-72
- etc. (Fail < 60%)

## Policy Statements and Student Support Resources

### Accommodations for Students with Disabilities

Students who are experiencing a disability-related barrier should contact [Services for Students with Disabilities](#) (SSD). Further conversation with SSD, instructors, and the student may be warranted to ensure an accessible course experience.

### Michigan Engineering Honor Code

All students are presumed decent and honorable, and all students are bound by the Michigan Engineering Honor Code. Any violation of [the honor policies](#) will be reported to the Honor Council and sanctions or penalties may be assigned.

### Sexual & Gender-Based Misconduct and Mandatory Reporting

The University of Michigan supports its educational mission by fostering a community based on civility, dignity, diversity, inclusivity, education, equality, freedom, honesty, and safety. For more information review [Cultivating a Culture of Respect](#). Confidential support and academic advocacy can be found with the [Sexual Assault Prevention and Awareness Center](#) (SAPAC). Alleged violations can be non-confidentially reported to the Office for Institutional Equity at [institutional.equity@umich.edu](mailto:institutional.equity@umich.edu).

### Student Mental Health and Wellbeing

If you are experiencing concerns, seeking help is a courageous thing to do for yourself and those who care about you. If the source of your stressors is academic, please contact me so that we can find solutions together. For personal and academic concerns, the [Michigan Engineering C.A.R.E. Center](#) has helpful staff available.

### Course Materials Copyright & Usage Policy

The materials provided by the instructor in this course are copyrighted. Students are not permitted to record, reproduce, distribute, or publicly post their course materials without express faculty permission. [Copyright Basics](#) provides information about your rights and obligations under copyright law.

**Privacy in Recorded Class Activities**

Some synchronous course activities may be audio/video recorded and made available to other students in this course section. As part of your participation, you may be recorded. If you do not wish to be recorded, contact me the first week of class to discuss alternative arrangements.

**For additional policies and resources, view the course Canvas site.**



# 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: 2022-12-14

Effective Term: Fall 2023

<input checked="" type="checkbox"/>	Course Offered	<b>DO NOT USE ONLY</b> Date Received: Date Completed: Completed By:
	<input checked="" type="checkbox"/> Indefinitely <input type="checkbox"/> One term only	

CURRENT LISTING

REQUESTED LISTING

<input checked="" type="checkbox"/>	Dept (Home): Subject: Catalog:			Dept (Home): Aerospace Engineering Subject: AEROSP Catalog: 656		
<input type="checkbox"/>	<input type="checkbox"/> Course is Cross-Listed with Other Departments			<input type="checkbox"/> Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
<input checked="" type="checkbox"/>	Course Title (full title)			Course Title (full title) Technical Project Management & Leadership Skills for Engineers		
<input checked="" type="checkbox"/>	Abbreviated Title (20 char)			Abbreviated Title (20 char) Tech Proj Mgmt		
<input checked="" type="checkbox"/>	Course Description (Please limit to 50 words and attach separate sheet if necessary) Provides essential project management skills and tools. Topics range from initiating projects and project planning through project execution, control, and close-out. Emphasizes commonly used tools and their practical application along with the interpersonal skills to successfully manage complex technical projects.					
<input checked="" type="checkbox"/>	Full Term Credit Hours			Half Term Credit Hours		
	Undergraduate Min:	Graduate Min: 1.5		Undergraduate Min:	Graduate Min:	
	Undergraduate Max:	Graduate Max: 1.5		Undergraduate Max:	Graduate Max:	
<input checked="" type="checkbox"/>	Course Credit Type Non-Rackham Graduate Student					
<input type="checkbox"/>	Repeatability <input type="checkbox"/> Course is Repeatable for Credit Maximum number of repeatable credits:					
	<input type="checkbox"/> Course is Y graded <input type="checkbox"/> Can be taken more than once in the same term					

	Subject:	Catalog:
<input checked="" type="checkbox"/>	<b>Grading Basis</b> <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 <b>Grading</b> <input type="checkbox"/> Not for Credit <input type="checkbox"/> Not for Degree Credit <input type="checkbox"/> Degree Credit Only	
	<b>Add Consent</b> <input type="checkbox"/> Department Consent <input type="checkbox"/> Instructor Consent <input checked="" type="checkbox"/> No Consent	<b>Drop Consent</b> <input type="checkbox"/> Department Consent <input type="checkbox"/> Instructor Consent <input checked="" type="checkbox"/> No Consent

	CURRENT LISTING	REQUESTED LISTING
<input type="checkbox"/>	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
<input checked="" type="checkbox"/>	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Declaration in MEng program in Global Aerospace Leadership Minimum grade requirement:
<input type="checkbox"/>	Credit Exclusions	Credit Exclusions
<input checked="" type="checkbox"/>	<b>Course Components</b> <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	<b>Graded Component</b> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
	<b>Terms Typically Offered</b> <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: Nicole Friedberg <span style="float: right;">Cognizant Faculty Member Title: Lecturer</span>		

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

Contact Person: Liza Roberts      Email: lizatate@umich.edu      Phone: (734) 936-0108

CoE Curriculum

Committee Representative:

*K. G. Powell*

Print: Kenneth G Powell

Date: 12/19/22

CoE Curriculum Committee Chair:

Print:

Date:

Home Department Chair:

*Anthony Waas*

Print: ANTHONY WAAS

Date: 12/20/22

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 DescriptionCourse Description

Provides essential project management skills and tools. Topics range from initiating projects and project planning through project execution, control, and close-out. Emphasizes commonly used tools and their practical application along with the interpersonal skills to successfully manage complex technical projects.

Class LengthClass Length

Full term

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

1.5

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:

Required course for all students in the online Global Aerospace Leadership MEng program

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

This course is a required course for the new online Master of Engineering in Global Aerospace Leadership program (Aerospace Engineering department).

# Technical Project Management & Leadership Skills for Engineers

## AEROSP 656 – Fall 2023 – 1.5 Credits

University of Michigan, Course Syllabus

### Syllabus Outline

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• <a href="#">Instructor and GSI Information</a></li> <li>• <a href="#">Program and Technical Support</a></li> <li>• <a href="#">Course Description</a></li> <li>• <a href="#">Learning Objectives</a></li> <li>• <a href="#">Course Needs and General Overview</a></li> <li>• <a href="#">Participation and Communication</a></li> </ul> | <ul style="list-style-type: none"> <li>• <a href="#">Course Schedule</a></li> <li>• <a href="#">Assignment/Task Submission Details</a></li> <li>• <a href="#">Course Guidelines</a></li> <li>• <a href="#">Grading Overview</a></li> <li>• <a href="#">Policy Statements and Student Support Resources</a></li> </ul> |
|--|---|

### Instructor and GSI Information

#### Faculty Information

Nicole Friedberg, MBA MBB PMP | [nmtucker@umich.edu](mailto:nmtucker@umich.edu)

Contact Info: Please message directly within our course Canvas site or via email.

#### Office Hours on Zoom

- Faculty office hours are Mondays 2-3pm EST.
- Additional office hours by appointment.



## Program and Technical Support

### For Program Support

To get help related to enrollment, advising, and program items, please contact the Global Aerospace Leadership Program Coordinator, Liza Roberts ([lizatate@umich.edu](mailto:lizatate@umich.edu)).

### For Course Technical Support

For questions or issues with Canvas, contact the Nexus Design Team [nexusdesign@umich.edu](mailto:nexusdesign@umich.edu)

## Course Description

Most engineers inevitably find themselves in the role of a project manager. Here, they may be tasked with leading the development of a new product component/process, or technical problem-solving initiative. A key attribute of these complex technical projects is an unknown best solution. For many designers and engineers, the project management and leadership skills necessary to lead such efforts are developed informally. This course provides essential project management skills and tools. The course topics range from initiating projects and project planning through project execution, control, and close-out. The course emphasizes commonly used tools and their practical application along with the interpersonal skills to successfully manage complex technical projects. The course focuses on helping technical project leaders select the right approach and use the right tools for projects with unknown best solutions.

## Learning Objectives

- Understand the Project Management lifecycle & applicable concepts/tools in each phase
- Gather project requirements and establish project scope
- Evaluate project components, durations, and sequencing to create a project plan
- Analyze project risks and quality using different techniques
- Analyze alternatives to select the best solution
- Utilize documentation techniques to manage change, facilitate communication, and monitor project progress
- Apply facilitation techniques through exercise simulations
- Apply the concepts and tools to manage projects

## Course Needs and General Overview

### Course Textbook & Materials

- None

### Useful Web Sites for Reference

- Additional supplemental course lectures for reference

### Technology Requirements

For the program specifics please see the [full technology requirements](#).

### Course Format

Our lecture videos are available asynchronously. Weekly tasks include watching lectures, completing graded exercises (quizzes), and working on your project.

## Participation and Communication

### Expectations for Participation

- Throughout the course there are opportunities to interact with peers to practice leadership and interpersonal skills via discussion posts.
- Each week you will watch lecture videos on our focus topic and complete the graded exercises.
- Practice exercises are available prior to the graded exercises and are not required.
- Some weeks, assignments will be discussion posts with peers to practice leadership and interpersonal skills or are based on the course project.

### Course Communication

- Course communication will be via Canvas course announcements.

## Course Schedule

Below is our general course schedule. Any updates or changes are in our course Canvas site

Wk#	Topics	Assignments/Tasks	Task Date Given	Task Due Date
1	1. Overview of Project Management (PM) 2. PM Models and Technical Problem Solving Frameworks	Exercise 1	Aug 28	Sept 5
2	3. <b>Project Initiation:</b> Requirements Gathering and Stakeholder Analysis 4. Project Charter, Scope, and Rules	Capstone Project Charter Draft	Aug 28	Sept 10
3	5. <b>Project Planning:</b> Work Breakdown Structure	Exercise 2	Sept 11	Sept 17
4	6. Resource Planning	Exercise 3: Negotiation Scenarios	Sept 18	Oct 1
5	7. Time and Cost Estimates for Project Activities 8. Sequencing Activities and Resource Optimization	Exercise 4	Sept 25	Oct 1
6	9. Project Scheduling and Budgeting 10. Advanced Scheduling Methods: Program Evaluation and Review Techniques (PERT) and Advanced Scheduling Techniques	Exercise 5	Oct 2	Oct 8
7	No Lecture - Project Work Time	Project Part 1	Aug 28	Oct 18
8	11. Communication Management and Project Communication Tools 12. Evidence-based Decision Making	Exercise 6	Oct 23	Oct 29
9	13. Project Risk Management 14. Quality Assurance Planning	Exercise 7	Oct 30	Nov 5
10	15. <b>Execution:</b> Project Execution and Project Status Reports 16. Managing Project Change and Contingency Planning	Exercise 8	Nov 6	Nov 12

Wk#	Topics	Assignments/Tasks	Task Date Given	Task Due Date
11	17. <b>Monitor:</b> Project Monitoring and Control 18. Milestone Management and Stage Gate Review 19. <b>Closing:</b> Project Closeout Activities	Exercise 9	Nov 13	Nov 19
12	20. Human Resource Management and Project Teams 21. Developing Project Managers: Interpersonal Skills and Leadership	Exercise 10: Video roleplay simulation	Nov 20	Dec 3
13	No Lecture - Project Work Time	Project Progress Check	Nov 27	Dec 3
14	22. Course Summary	Project Part 2 Project Discussion Post	Aug 29 Dec 4	Dec 4 Dec 6

Table 1: General outline of our modules, course topics/readings, assignments/tasks, date tasks are given, and date tasks are due.

## Assignment/Task Submission Details

All course assignments may be found in the Assignment section of Canvas. The exam will not be visible until the scheduled date/time at the end of the term. See the [Registrar's Academic Calendar](#) for more details.

### **10 Practice Exercises – not graded**

Practice exercises are available, and not graded, for each of the 10 graded exercises/quizzes.

### **10 Quizzes – 160 pts**

Quizzes are a combination of multiple choice and/or short answer questions. Exercises 3 and 10 are completed via Canvas discussion boards.

- Exercise 1 – PM Overview, PM Models, Technical Problem Solving Frameworks (15 pts)
- Exercise 2 – Project Planning (10 pts)
- Exercise 3 – Negotiation scenarios: students will be assigned to small groups. Each student is given a role to play in the scenario. Students will negotiate via Canvas discussion posts while in their role. After the negotiation, each student posts in the group discussion post on their experience with the assignment. This assignment will span two weeks.

- Exercise 4 – Time and Cost Estimates, Sequencing Activities, Resource Optimization (15 pts)
- Exercise 5 – Project Schedule and Budgeting, Advanced Scheduling Methods (15 pts)
- Exercise 6 – Communication, Evidence-based Decision Making (15 pts)
- Exercise 7 – Risk Management, Quality Assurance Planning (15 pts)
- Exercise 8 – Execution, Managing Project Change, Contingency Planning (15 pts)
- Exercise 9 – Monitor, Milestone Management, Closing (20 pts)
- Exercise 10 – Video roleplay simulation: each student will select one scenario from a list to act out. You will upload a video of you acting out that scenario to a discussion board. You will then comment on 3 student videos to state the observations. The assignment will span two weeks.

#### **Capstone Project Charter – 20 pts**

- In this program, you will complete a capstone project. While we learn about project charters in this course, you will create your capstone project charter and submit via Canvas file upload.

#### **Project – 120 pts**

- The course project is a format to apply concepts learned throughout the course. Students may work in teams up to two. The project will be submitted via Canvas file upload and graded in two parts. In part 1, you will build a charter, identify a fictional team, and convert a project description into a WBS and schedule. In part 2, you will be given a scenario and will adjust your schedule accordingly using concepts learned in the course. The project will be graded using a rubric.
- There is one project progress check in toward the end of the course. This is a survey completed via Canvas to notify the instructor if you are on track to complete your project.
- After you submit your project, there is a class discussion post where you will discuss challenges you faced in the project and then comment on three other students' posts.

#### **Exam – 100 pts**

- The exam consists of multiple choice and short answer questions. The [University of Michigan Honor Code](#) applies during the exam and students must work independently. The exam is completed via Canvas and students will submit their results in a 2 hour time period.

## Course Guidelines

- We understand you may have challenges meeting certain due dates (e.g., related to job, academic commitments, religious or cultural observances, etc.). As such, you may make requests for extension of any assignment due dates. Extension requests should be approved by the course instructor. The purpose of the course schedule is to keep you on pace for the semester and align you with class discussion posts.
- Students may work on the course project individually or in teams of 2. Teams will not be assigned. If desired, students need to identify a teammate for the project and notify the instructor that they will be working together on the course project.

## Grading Overview

Coursework will be graded per the following breakdown.

Assignments/Tasks	Points	% Of Grade
Practice Quizzes for sessions 1-21 (not graded)	N/A	N/A
Quizzes (10 total)	160	40%
Capstone Project Charters	20	5%
Final Exam – 50 questions	100	25%
Final Project – 2 parts	100	25%
Project Progress Check	5	1%
Project Discussion Posts	15	4%
<b>Total for all</b>	<b>400</b>	<b>100%</b>

Table 2: Overview with points for each assignment/task and percentage of that item to the total grade.

## Expected Grading Scale

In our course, grades are calculated by...

- A+ = 97-100
- A = 93-96
- A- = 90-92
- B+ = 87-89
- B = 83-86
- B- = 80-82
- C+ = 77-79
- C = 73-76
- C- = 70-72
- etc. (Fail < 60%)

## Policy Statements and Student Support Resources

### Accommodations for Students with Disabilities

Students who are experiencing a disability-related barrier should contact [Services for Students with Disabilities](#) (SSD). Further conversation with SSD, instructors, and the student may be warranted to ensure an accessible course experience.

### University of Michigan College of Engineering Honor Code

All students are presumed decent and honorable, and all students are bound by the College of Engineering Honor Code. Any violation of [the honor policies](#) will be reported to the Honor Council and sanctions or penalties may be assigned.

### Sexual & Gender-Based Misconduct and Mandatory Reporting

The University of Michigan supports its educational mission by fostering a community based on civility, dignity, diversity, inclusivity, education, equality, freedom, honesty, and safety. For more information review [Cultivating a Culture of Respect](#). Confidential support and academic advocacy can be found with the [Sexual Assault Prevention and Awareness Center](#) (SAPAC). Alleged violations can be non-confidentially reported to the Office for Institutional Equity at [institutional.equity@umich.edu](mailto:institutional.equity@umich.edu).

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If you are experiencing concerns, seeking help is a courageous thing to do for yourself and those who care about you. If the source of your stressors is academic, please contact me so that we can find solutions together. For personal and academic concerns, the [Michigan Engineering C.A.R.E. Center](#) has helpful staff available.

### Course Materials Copyright & Usage Policy

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express faculty permission. [Copyright Basics](#) provides information about your rights and obligations under copyright law.

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Some synchronous course activities may be audio/video recorded and made available to other students in this course section. As part of your participation, you may be recorded. If you do not wish to be recorded, contact me the first week of class to discuss alternative arrangements.

**For additional policies and resources, view the course Canvas site.**





## Course Approval Request Form

Office of the Registrar, University of Michigan

1210 ISA 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: 2022-12-15

Effective Term: Fall 2023

<input checked="" type="checkbox"/>	Course Offered	<b>DO NOT USE ONLY</b> Date Received: Date Completed: Completed By:
	<input checked="" type="checkbox"/> Indefinitely <input type="checkbox"/> One term only	

#### CURRENT LISTING

#### REQUESTED LISTING

<input checked="" type="checkbox"/>	Dept (Home): Subject: Catalog:			Dept (Home): Aerospace Engineering Subject: AEROSP Catalog: 690		
<input type="checkbox"/>	<input type="checkbox"/> Course is Cross-Listed with Other Departments			<input type="checkbox"/> Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
<input checked="" type="checkbox"/>	Course Title (full title)			Course Title (full title) Financial Analysis for Non-Finance Managers		
<input checked="" type="checkbox"/>	Abbreviated Title (20 char)			Abbreviated Title (20 char) Fin An Non-Fin Mgrs		
<input checked="" type="checkbox"/>	Course Description (Please limit to 50 words and attach separate sheet if necessary) Explores decision-making frameworks using evaluation tools to evaluate the impact and efficacy of different projects. Takes a deep dive into valuation at the firm level, getting to grips with new techniques and mechanisms to estimate the value of an enterprise.					
<input checked="" type="checkbox"/>	Full Term Credit Hours Undergraduate Min: Graduate Min: 1 Undergraduate Max: Graduate Max: 1			Half Term Credit Hours Undergraduate Min: Graduate Min: Undergraduate Max: Graduate Max:		
<input checked="" type="checkbox"/>	Course Credit Type Non-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"/>	<b>Grading Basis</b> <input type="checkbox"/> Graded (A – E) <input type="checkbox"/> Credit/No Credit <input checked="" type="checkbox"/> Satisfactory/Unsatisfactory <input type="checkbox"/> Pass/Fail <input type="checkbox"/> Business Administration <b>Grading</b> <input type="checkbox"/> Not for Credit <input type="checkbox"/> Not for Degree Credit <input type="checkbox"/> Degree Credit Only	<b>Add Consent</b> <input type="checkbox"/> Department Consent <input type="checkbox"/> Instructor Consent <input checked="" type="checkbox"/> No Consent  <b>Drop Consent</b> <input type="checkbox"/> Department Consent <input type="checkbox"/> Instructor Consent <input checked="" type="checkbox"/> No Consent

	CURRENT LISTING	REQUESTED LISTING
<input type="checkbox"/>	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
<input checked="" type="checkbox"/>	Enforced Prerequisite (254 char)  Minimum grade requirement:	Enforced Prerequisite (254 char) Declaration in MEng program in Global Aerospace Leadership Minimum grade requirement:
<input type="checkbox"/>	Credit Exclusions	Credit Exclusions
<input checked="" type="checkbox"/>	<b>Course Components</b> <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	<b>Graded Component</b> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <b>Terms Typically Offered</b> <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: George Halow      Cognizant Faculty Member Title: Professor of Practice		

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

Contact Person: Liza Roberts      Email: lizatate@umich.edu      Phone: (734) 936-0108

CoE Curriculum

Committee Representative:



Print: Kenneth G Powell

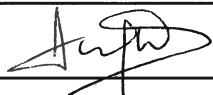
Date: 12/19/22

CoE Curriculum Committee Chair:

Print:

Date:

Home Department Chair:



Print: ANTHONY WAAS

Date: 12/20/2022

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 DescriptionCourse Description

Explores decision-making frameworks using evaluation tools to evaluate the impact and efficacy of different projects. Takes a deep dive into valuation at the firm level, getting to grips with new techniques and mechanisms to estimate the value of an enterprise.

Class LengthClass Length

Full term

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

1

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

Home dept

Describe how this course fits with the degree requirements:

Required course for all students in the online Global Aerospace Leadership MEng program

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

This course is a required course for the new online Master of Engineering in Global Aerospace Leadership program (Aerospace Engineering department).

# Financial Analysis for Non-Financial Managers

## AEROSP 690 – Fall 2023 – 1 Credit

University of Michigan, in partnership with INSEAD, Course Syllabus

### Instructor Information

#### Faculty Information

**U-M Instructor of Record:** George Halow

**Contact Info:** Please message me directly within our course Canvas site.

**Note:** This course will be taught by INSEAD faculty. Please message them directly through the course Canvas site.

### Program and Technical Support

#### For Program Support

To get help related to enrollment, advising, and program items, please contact the Global Aerospace Leadership Program Coordinator, Liza Roberts ([lizatate@umich.edu](mailto:lizatate@umich.edu)).

#### For Course Technical Support

For questions or issues with Canvas, contact the Nexus Design Team [nexusdesign@umich.edu](mailto:nexusdesign@umich.edu)

### Course Needs and General Overview

#### Course Textbook & Materials

- There is no required course textbook. Lectures will be supplemented via online resources.

#### Technology Requirements

For the program specifics please see the [full technology requirements](#).

#### Course Format

Our lectures are available asynchronously (taped recordings).

## Grading Overview

You will earn a grade of Satisfactory or Unsatisfactory in this course. Coursework will be graded per the following breakdown.

Assignments/Tasks	Minimum Points to Earn a Satisfactory Grade
In-platform learning activities and weekly ALP submissions	930
Final ALP Assignment submission	6

## Policy Statements and Student Support Resources

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# Financial Analysis for Non-Financial Managers

Programme Syllabus

# Programme Overview

Progressing towards greater leadership positions means learning to cut through greater complexity. It means broadening your understanding of the entire business, in order to make the most effective strategic and tactical decisions. Finance is one of the core pillars of any business organisation. Building financial understanding into your decision-making is critical as you advance. So too is developing the financial literacy to communicating your decision both inside and outside of your organisation.

Financial Analysis for Non-Financial Managers accelerates your understanding of the core financial dimensions of business. The programme empowers you with a robust valuation framework to make strategic decisions on future investments – and to assess the impact of past decisions you and your business have taken.

The programme will explore decision-making frameworks within the firm, using evaluation tools to evaluate the impact and efficacy of different projects. It will take a deep dive into valuation at the firm level, getting to grips with new techniques and mechanisms to estimate the value of an enterprise.

You will emerge from the programme with the understanding, the knowledge and the skills to make solid financial forecasts and better strategic decisions. You benefit from enhanced ability to execute your decisions, while accurately monitoring past investments. And you will build the expertise and the confidence to communicate your plans and results to both financial and nonfinancial audiences.

## Programme Learning Objectives:

- Enhance your literacy of financial statements and terminology
- Improve your understanding of how strategic decisions impact financial metrics
- Gain insights into how revenues, costs and profits are allocated to products, customers, and divisions
- Learn methodologies of financial decision making based on rigorous, but intuitive, frameworks including net present value (NPV), Internal Rate of Return (IRR), and Economic Value Added (EVA).



# Weekly Learning Objectives

The programme is delivered over 8 weeks. First, you will start with the launch week to familiarise yourself with the programme. Following this, there will be 5 weeks of course content followed by 2 weeks to finish project work and engage in peer review. Each week of content follows a very clear path to facilitate learning for you.

## Launch Week

In Launch Week, you will find guidance on how to make the most of the course, information on course completion and certification requirements, and an overview of the journey you will take over the next weeks. You will learn how to navigate the platform and about the different functionalities available.

You will also find out about your “Action Learning Project” (ALP). Your ALP is a unique opportunity to apply your learning to your own business context. The ALP will take you on a step-by-step journey to develop a financial perspective on a current business decision you are facing. You will identify a specific strategic opportunity and then quantify the predicted financial effects of various possible outcomes following a recommended action. During Launch Week, you will need to start thinking about the scope of your ALP and finalise it with your learning coach.

Note: In order to successfully pass this course, you must complete your ALP to a high standard. This is one of the most important components of the course.

## Week 1: Financial Acumen

Financial reports provide information about how a company allocates its resources and how well it uses those resources to execute its strategy. Hence, financial acumen is a key part of successful strategic thinking. With this in mind, we begin by discussing the balance sheet and income statement, which are the two key financial statements. We discuss why these statements are presented to investors and the information they convey. We then deepen our understanding of financial reports and discuss how to use them to evaluate a company’s strategy execution. We discuss key financial reporting issues including the difference between cash and accrual accounting, capitalising versus expensing costs, and subsequently move on to studying the cash flow statements to understand the sources and uses of cash.

### Learning Objectives:

- Build What information is contained in the Balance Sheet, Income Statement and Statement of Cash Flows?
- What information is missing from these statements?
- How are these statements connected to each other?
- How can I use these statements when making strategic decisions?

# Weekly Learning Objectives



## Week 2: Decision Making: Information Needs

Financial information about the firm's products, services, processes, assets, and customers provides managers with key inputs to understand the firm's current performance and support value-based decision making. In Week 2, our main objective is to equip you with the ability to understand and evaluate profitability information from the perspective of a manager inside the organization. We begin by considering cost and profit behaviour and how profitability is determined. We then apply this analysis to any unit within the organization: company, division, product, and even to individual customers. This week will give participants a deeper understanding of the financial information they receive as managers, how to interpret and use it, and insight as to what questions to ask.

### Learning Objectives:

- Why is it necessary to understand cost behaviour?
- How do costs behave?
- What financial information should I focus on – and what should I ignore when making strategic decisions?
- How can I effectively measure profitability?

## Week 3: Financial Statement Analysis

We build on the previous material by combining the analysis of profitability (week two) with our understanding of the investments per the balance sheet (week one). This allows us to formally define Return on Invested Capital (ROIC). With the understanding of this definition, we discuss how to use ROIC to evaluate strategic execution. We identify the key drivers of ROIC, which are: productivity, margins, and cost structure. We discuss how to decompose ROIC so that we can evaluate two key drivers of productivity: (1) fixed asset utilization and (2) working capital management. Throughout the discussion we emphasize a key characteristic of ROIC: It allows us to use our intuition, experience, and judgment to understand and evaluate a company's strategic choices.

### Learning Objectives:

- What is Return on Invested Capital (ROIC)?
- Why is ROIC so important to firms?
- How can I use ROIC measures to evaluate the productivity of investments?
- How can I use ROIC to evaluate the profit margins from sales?

# Weekly Learning Objectives



## Week 4: Value Based Management

The objective of this module is to understand how to use ROIC to link our intuition, experience, and judgment to value. We continue our discussion from the previous week about how to use ROIC to understand and evaluate strategic choices. We discuss how to decompose ROIC so that we can evaluate margins and cost structure. Next, we discuss how to integrate all of the components of ROIC so that we can evaluate a company's overall performance—i.e., the combination of effects related to productivity, margins and cost structure.

Next, we focus on value and value-based management. Although investors want a return on their investment, their ultimate desire is cash. Hence, we begin by discussing a key concept: Operating Free Cash Flow (OFCF). We establish two fundamental links: (1) the link between ROIC and OFCF and (2) the link between OFCF and value. These links are important because they allow us to link our intuition, experience, and judgment to the valuation of projects. Once we have established these links, we discuss three approaches to value-based management: Net present value (NPV), internal rate of return (IRR), and payback. We explain the intuition behind each approach and how that approach is implemented in practice.

### Learning Objectives:

- Why is cash flow so important to value creation?
- How do I link ROIC to cash flow?
- How can I forecast ROIC?
- What are the preferred decision-making rules that utilize ROIC and cash flow?

# Weekly Learning Objectives



50

Online

## Week 5: Performance Evaluation

So far, we have learned how successful managers use financial information to make value enhancing decisions. In our final week we discuss how best to evaluate the personnel who make decisions throughout the organization. We will develop tools to evaluate the performance of managers and their divisions' performance. We introduce and evaluate some commonly used financial performance metrics and consider their benefits and potential weaknesses for performance evaluation. We then consider how to link strategy to both financial and non-financial performance metrics to achieve organisational objectives, as well as the strengths and weaknesses of using performance measures to explicitly incentivize employees.

### Learning Objectives:

- What are the commonly used measures of performance evaluation?
- Under what conditions are these measures consistent with long-term value creation?
- When are these measures inconsistent with long-term value creation?
- How do you link financial and non-financial performance to your organisation's strategy and objectives?

## Week 6 - 7: Final Assignment and Peer Review

These two weeks are for you to synthesise your learning from the past few weeks into a compelling Final ALP Assignment submission. It will also offer an opportunity for you to give feedback to, and receive feedback from your peers for the Final ALP Assignment. No new course content will be released in these weeks.



## Completion and Certification

To successfully complete the programme and earn certification, you are required to meet all of the following criteria:

- Earn a minimum of 930 points from in-platform learning activities and weekly ALP submissions
- Earn a Badge (Passing or Distinction) by reaching a minimum of 6 points from your Final ALP Assignment submission, (final score based on review process & INSEAD's validation)

If you meet the minimum criteria for certification as outlined above, you will receive an INSEAD Online Certificate that you can share on your LinkedIn profile.

## Distinctions

To earn a distinction on this online programme, you are required to meet both of the following criteria:

- Earn the maximum number of points (1160 points) from in-platform learning activities and weekly ALP submissions
- Earn a distinction badge by reaching the maximum number of points (10 points) from your final assignment submission, based on review and INSEAD's validation.

## Earning a Badge



To earn a "**Distinction Badge**", your final assignment needs to be granted 100% of the maximum number of points from the review process. This score will be validated by the INSEAD team who will then reward you with a badge accordingly.



To earn a "**Pass Badge**", your final assignment needs to be granted at least 60% of the maximum number of points from the review process. This score will be validated by the INSEAD team who will then reward you with a badge accordingly.



## 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: 2022-12-08

Effective Term: Fall 2023

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

#### CURRENT LISTING

#### REQUESTED LISTING

<input type="checkbox"/>	Dept (Home): Material Science Engineering Subject: MATSCIE Catalog: 412			Dept (Home): Material Science Engineering Subject: MATSCIE Catalog: 412		
<input type="checkbox"/>	<input checked="" type="checkbox"/> Course is Cross-Listed with Other Departments			<input checked="" type="checkbox"/> Course is Cross-Listed with Other Departments		
<input type="checkbox"/>	Department	Subject	Catalog Number	Department	Subject	Catalog Number
<input type="checkbox"/>	CHEMICAL - CHE - 412 MACROMOLECULAR - MACROMOL - 412			CHEMICAL - CHE - 412 MACROMOLECULAR - MACROMOL - 412		
<input type="checkbox"/>	Course Title (full title) Polymeric Materials			Course Title (full title) Polymeric Materials		
<input type="checkbox"/>	Abbreviated Title (20 char) Polymeric Materials			Abbreviated Title (20 char) Polymeric Materials		
<input type="checkbox"/>	Course Description (Please limit to 50 words and attach separate sheet if necessary) The synthesis, characterization microstructure, rheology, and processing of polymeric materials. Polymers in solution and in the liquid, liquid-crystalline, crystalline, and glassy states. Engineering and design properties, including viscoelasticity, yielding, and fracture. Forming and processing methods. Recycling and environmental issues.					
<input type="checkbox"/>	Full Term Credit Hours Undergraduate Min: 3      Graduate Min: 3 Undergraduate Max: 3      Graduate Max: 3			Half Term Credit Hours Undergraduate Min:      Graduate Min: Undergraduate Max:      Graduate Max:		
<input type="checkbox"/>	Course Credit Type Undergraduate Student, 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: Material Science Engineering

Catalog: 412

<input type="checkbox"/>	Grading Basis		
	<input checked="" type="checkbox"/> Graded (A – E)		
	<input type="checkbox"/> Credit/No Credit		
	<input type="checkbox"/> Satisfactory/Unsatisfactory	Add Consent	Drop Consent
	<input type="checkbox"/> Pass/Fail	<input type="checkbox"/> Department Consent	<input type="checkbox"/> Department Consent
	<input type="checkbox"/> Business Administration	<input type="checkbox"/> Instructor Consent	<input type="checkbox"/> Instructor Consent
	Grading	<input checked="" type="checkbox"/> No Consent	<input checked="" type="checkbox"/> No Consent
	<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)	Advisory Prerequisite (254 char)																					
<input checked="" type="checkbox"/>	Enforced Prerequisite (254 char) (MATSCIE 220 or 250) and CHEM 210; (C- or better)] or Graduate Minimum grade requirement: C-	Enforced Prerequisite (254 char) MSE 220 or 250 (C- or better)] or Graduate Standing Minimum grade requirement: C-																					
<input type="checkbox"/>	Credit Exclusions	Credit Exclusions																					
<input 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 type="checkbox"/> Winter</td> </tr> <tr> <td><input type="checkbox"/> Recitation</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/> Spring</td> </tr> <tr> <td><input type="checkbox"/> Lab</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/> Summer</td> </tr> <tr> <td><input 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 type="checkbox"/> Winter	<input type="checkbox"/> Recitation	<input type="checkbox"/>	<input type="checkbox"/> Spring	<input type="checkbox"/> Lab	<input type="checkbox"/>	<input type="checkbox"/> Summer	<input type="checkbox"/> Discussion	<input type="checkbox"/>	<input type="checkbox"/> Spring/Summer	<input type="checkbox"/> Independent Study	<input type="checkbox"/>		
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<input type="checkbox"/> Independent Study	<input type="checkbox"/>																						
Cognizant Faculty Member Name: Brian Love		Cognizant Faculty Member Title:																					

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

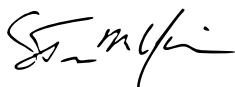
Contact Person:

Email:

Phone:

CoE Curriculum

Committee Representative:



Print: Steven M. Yalisove

Date: 12/8/22

CoE Curriculum Committee Chair:

Print:

Date:

Home Department Chair:

Print: Amit Misra

Date: 12/8/2022

Cross-Listed Department Chair:



Print: Jinsang Kim

Date: 12/8/22

Cross-Listed Department Chair:



Print: Sharon C. Glotzer

Date: 12/12/2022

Cross-Listed Department Chair:

Print:

Date:

DEPARTMENTAL/COLLEGE USE ONLY



**Current:****Requested:**Course Description

The synthesis, characterization microstructure, rheology, and processing of polymeric materials. Polymers in solution and in the liquid, liquid-crystalline, crystalline, and glassy states. Engineering and design properties, including viscoelasticity, yielding, and fracture. Forming and processing methods. Recycling and environmental issues.

Class Length

Full term

Contact hours (lecture):

3

Contact hours (recitation)Contact hours (lab)Course Description

The synthesis, characterization microstructure, rheology, and processing of polymeric materials. Polymers in solution and in the liquid, liquid-crystalline, crystalline, and glassy states. Engineering and design properties, including viscoelasticity, yielding, and fracture. Forming and processing methods. Recycling and environmental issues.

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:

MSE requests that the enforced prerequisite for this course Chem 210 be removed. Chem 210 is no longer needed, MSE 412 incorporated the needed content in the course.



## Course Approval Request Form

Office of the Registrar, University of Michigan

1210 LSA Building

500 S. State Street

Ann Arbor, MI 48109-1382

Phone: 734.763.2113

Fax: 734.936.3148

ro.curriculum@umich.edu

ro.umich.edu

☒ **CHECK APPROPRIATE BOXES FOR ALL CHANGES**

Action Requested

- ☐ New Course  
☒ Modification of Existing Course  
☐ Deletion of Existing Course

Date of Submission: 2022-12-08

Effective Term: Fall 2023

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

**CURRENT LISTING**

**REQUESTED LISTING**

<input type="checkbox"/>	Dept (Home): Material Science Engineering Subject: MATSCIE Catalog: 440			Dept (Home): Material Science Engineering Subject: MATSCIE Catalog: 440		
<input type="checkbox"/>	<input type="checkbox"/> Course is Cross-Listed with Other Departments			<input type="checkbox"/> Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
<input type="checkbox"/>						
<input type="checkbox"/>	Course Title (full title) Ceramic Materials			Course Title (full title) Ceramic Materials		
<input type="checkbox"/>	Abbreviated Title (20 char) Ceramic Materials			Abbreviated Title (20 char) Ceramic Materials		
<input type="checkbox"/>	Course Description (Please limit to 50 words and attach separate sheet if necessary) Chemistry, structure, processing, microstructure and property relationships and their applications in design and production of ceramic materials.					
<input type="checkbox"/>	Full Term Credit Hours			Half Term Credit Hours		
	Undergraduate Min: 3	Graduate Min: 3		Undergraduate Min:	Graduate Min:	
<input type="checkbox"/>	Undergraduate Max: 3			Undergraduate Max:		
	Graduate Max: 3			Graduate Max:		
<input type="checkbox"/>	Course Credit Type Undergraduate Student, 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: Material Science Engineering Catalog: 440

<input type="checkbox"/>	Grading Basis		
	<input checked="" type="checkbox"/> Graded (A – E)		
	<input type="checkbox"/> Credit/No Credit		
	<input type="checkbox"/> Satisfactory/Unsatisfactory	Add Consent	Drop Consent
	<input type="checkbox"/> Pass/Fail	<input type="checkbox"/> Department Consent	<input type="checkbox"/> Department Consent
	<input type="checkbox"/> Business Administration	<input type="checkbox"/> Instructor Consent	<input type="checkbox"/> Instructor Consent
	Grading	<input checked="" type="checkbox"/> No Consent	<input checked="" type="checkbox"/> No Consent
	<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) MSE 350 Advised	Advisory Prerequisite (254 char) MSE 350 Advised
<input checked="" type="checkbox"/>	Enforced Prerequisite (254 char) MATSCIE 335; (C- or better) Minimum grade requirement: C-	Enforced Prerequisite (254 char)  Minimum grade requirement:
<input type="checkbox"/>	Credit Exclusions	Credit Exclusions
<input 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"/> <input type="checkbox"/>
		Terms Typically Offered <input 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: Ferdinanad Poudeu		Cognizant Faculty Member Title:

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

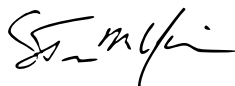
Contact Person:

Email:

Phone:

CoE Curriculum

Committee Representative:



Print: Steven M. Yalisove

Date: 12/8/22

CoE Curriculum Committee Chair:

Print:

Date:

Home Department Chair: Amit Misra

Print: Amit Misra

Date: 12/8/2022

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

Chemistry, structure, processing, microstructure and property relationships and their applications in design and production of ceramic materials.

Course Description

Chemistry, structure, processing, microstructure and property relationships and their applications in design and production of ceramic materials.

Class Length

Full term

Class Length

Full term

Contact hours (lecture):

3

Contact hours (lecture):

3

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

Home dept

Describe how this course fits with the degree requirements:

Other

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

The course no longer requires MSE 335 for an enforced pre req, due to instructor request.



## 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: 2022-12-08

Effective Term: Fall 2023

<input checked="" type="checkbox"/>	Course Offered	<b>DO NOT USE ONLY</b> Date Received: Date Completed: Completed By:
	<input checked="" type="checkbox"/> Indefinitely <input type="checkbox"/> One term only	

#### CURRENT LISTING

#### REQUESTED LISTING

<input type="checkbox"/>	Dept (Home): Material Science Engineering Subject: MATSCIE Catalog: 465			Dept (Home): Material Science Engineering Subject: MATSCIE Catalog: 465		
<input type="checkbox"/>	<input type="checkbox"/> Course is Cross-Listed with Other Departments			<input type="checkbox"/> Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
<input type="checkbox"/>						
<input type="checkbox"/>	Course Title (full title) Structural and Chemical Characterization of Materials			Course Title (full title) Structural and Chemical Characterization of Materials		
<input type="checkbox"/>	Abbreviated Title (20 char) Struc Chem Char Matl			Abbreviated Title (20 char) Struc Chem Char Matl		
<input type="checkbox"/>	Course Description (Please limit to 50 words and attach separate sheet if necessary) Study of the basic structural and chemical characterization techniques that are commonly used in materials science and engineering. X-ray, electron and neutron diffraction, a wide range of spectroscopies, microscopies, and scanning probe methods will be covered. Lectures will be integrated with a laboratory where the techniques will be demonstrated and/or used by the student to study a material. Techniques will be presented in terms of the underlying physics and chemistry.					
<input type="checkbox"/>	Full Term Credit Hours			Half Term Credit Hours		
	Undergraduate Min: 3	Graduate Min: 3		Undergraduate Min:	Graduate Min:	
<input type="checkbox"/>	Undergraduate Max: 3			Undergraduate Max:		
	Graduate Max: 3			Graduate Max:		
<input type="checkbox"/>	Course Credit Type Undergraduate Student, Rackham Graduate Student					
<input type="checkbox"/>	Repeatability					
	<input type="checkbox"/> Course is Repeatable for Credit Maximum number of repeatable credits:			<input type="checkbox"/> Course is Y graded <input type="checkbox"/> Can be taken more than once in the same term		

Subject: Material Science Engineering

Catalog: 465

<input type="checkbox"/>	Grading Basis		
	<input checked="" type="checkbox"/> Graded (A – E)		
	<input type="checkbox"/> Credit/No Credit		
	<input type="checkbox"/> Satisfactory/Unsatisfactory	Add Consent	Drop Consent
	<input type="checkbox"/> Pass/Fail	<input type="checkbox"/> Department Consent	<input type="checkbox"/> Department Consent
	<input type="checkbox"/> Business Administration	<input type="checkbox"/> Instructor Consent	<input type="checkbox"/> Instructor Consent
	Grading	<input checked="" type="checkbox"/> No Consent	<input checked="" type="checkbox"/> No Consent
	<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)	Advisory Prerequisite (254 char)																					
<input checked="" type="checkbox"/>	Enforced Prerequisite (254 char) MATSCIE 350 and 365; (C- or better) Minimum grade requirement: C-	Enforced Prerequisite (254 char) MATSCIE 350 (C- or better) Minimum grade requirement: C-																					
<input type="checkbox"/>	Credit Exclusions	Credit Exclusions																					
<input 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 type="checkbox"/> Winter</td> </tr> <tr> <td><input type="checkbox"/> Recitation</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/> Spring</td> </tr> <tr> <td><input type="checkbox"/> Lab</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/> Summer</td> </tr> <tr> <td><input 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 type="checkbox"/> Winter	<input type="checkbox"/> Recitation	<input type="checkbox"/>	<input type="checkbox"/> Spring	<input type="checkbox"/> Lab	<input type="checkbox"/>	<input type="checkbox"/> Summer	<input type="checkbox"/> Discussion	<input type="checkbox"/>	<input type="checkbox"/> Spring/Summer	<input type="checkbox"/> Independent Study	<input type="checkbox"/>		
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 type="checkbox"/> Winter																					
<input type="checkbox"/> Recitation	<input type="checkbox"/>	<input type="checkbox"/> Spring																					
<input type="checkbox"/> Lab	<input type="checkbox"/>	<input type="checkbox"/> Summer																					
<input type="checkbox"/> Discussion	<input type="checkbox"/>	<input type="checkbox"/> Spring/Summer																					
<input type="checkbox"/> Independent Study	<input type="checkbox"/>																						
Cognizant Faculty Member Name: Robert Hovden		Cognizant Faculty Member Title:																					

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

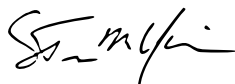
Contact Person:

Email:

Phone:

CoE Curriculum

Committee Representative:



Print: Steven M. Yalisove

Date: 12/8/22

CoE Curriculum Committee Chair:

Print:

Date:

Home Department Chair:

Amit Misra

Print:

Amit Misra

Date: 12/8/2022

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

Study of the basic structural and chemical characterization techniques that are commonly used in materials science and engineering. X-ray, electron and neutron diffraction, a wide range of spectroscopies, microscopies, and scanning probe methods will be covered. Lectures will be integrated with a laboratory where the techniques will be demonstrated and/or used by the student to study a material. Techniques will be presented in terms of the underlying physics and chemistry.

Class Length

Full term

Contact hours (lecture):

3

Contact hours (recitation)Contact hours (lab)Course Description

Study of the basic structural and chemical characterization techniques that are commonly used in materials science and engineering. X-ray, electron and neutron diffraction, a wide range of spectroscopies, microscopies, and scanning probe methods will be covered. Lectures will be integrated with a laboratory where the techniques will be demonstrated and/or used by the student to study a material. Techniques will be presented in terms of the underlying physics and chemistry.

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:

MSE requests that the enforced prerequisite of MSE 365 be removed, it is no longer needed for this course.



## Course Approval Request Form

Office of the Registrar, University of Michigan

1210 LSA Building

500 S. State Street

Ann Arbor, MI 48109-1382

Phone: 734.763.2113

Fax: 734.936.3148

ro.curriculum@umich.edu

ro.umich.edu

### ☒ CHECK APPROPRIATE BOXES FOR ALL CHANGES

#### Action Requested

- ☒ New Course  
☐ Modification of Existing Course  
☐ Deletion of Existing Course

Date of Submission: 2022-09-20

Effective Term: Fall 2023

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

#### CURRENT LISTING

#### REQUESTED LISTING

<input checked="" type="checkbox"/>	Dept (Home):			Dept (Home): Mechanical Engineering		
<input checked="" type="checkbox"/>	Subject:			Subject: MECHENG		
<input checked="" type="checkbox"/>	Catalog:			Catalog: 320		
<input type="checkbox"/>	<input type="checkbox"/> Course is Cross-Listed with Other Departments			<input checked="" type="checkbox"/> Course is Cross-Listed with Other Departments		
<input checked="" type="checkbox"/>	Department	Subject	Catalog Number	Department	Subject	Catalog Number
<input checked="" type="checkbox"/>				Naval Architecture & Marine Engineering - NAVARCH - 320		
<input checked="" type="checkbox"/>	Course Title (full title)			Course Title (full title) Introduction to Fluid Mechanics		
<input checked="" type="checkbox"/>	Abbreviated Title (20 char)			Abbreviated Title (20 char) Intro to Fluid Mech		
<input checked="" type="checkbox"/>	Course Description (Please limit to 50 words and attach separate sheet if necessary) Fluid statics; conservation of mass, momentum and energy in fixed and moving control volumes; steady and unsteady Bernoulli's equation; differential analysis of fluid flow; dimensional analysis and similitude; laminar and turbulent flow; boundary layers; lift and drag; applications to mechanical, marine, biological, environmental, and micro-fluidic systems.					
<input checked="" type="checkbox"/>	Full Term Credit Hours			Half Term Credit Hours		
<input checked="" type="checkbox"/>	Undergraduate Min: 3	Graduate Min:		Undergraduate Min:	Graduate Min:	
<input checked="" type="checkbox"/>	Undergraduate Max: 3	Graduate Max:		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 Maximum number of repeatable credits:					
<input type="checkbox"/>	<input type="checkbox"/> Course is Y graded <input type="checkbox"/> Can be taken more than once in the same term					



Subject:	Catalog:
<input checked="" type="checkbox"/>	<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <b>Grading Basis</b>  <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  <b>Grading</b>  <input type="checkbox"/> Not for Credit  <input type="checkbox"/> Not for Degree Credit  <input type="checkbox"/> Degree Credit Only         </div> <div style="width: 30%;"> <b>Add Consent</b>  <input type="checkbox"/> Department Consent  <input type="checkbox"/> Instructor Consent  <input checked="" type="checkbox"/> No Consent         </div> <div style="width: 30%;"> <b>Drop Consent</b>  <input type="checkbox"/> Department Consent  <input type="checkbox"/> Instructor Consent  <input checked="" type="checkbox"/> No Consent         </div> </div>

	CURRENT LISTING	REQUESTED LISTING
<input checked="" type="checkbox"/>	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char) Mechanical Engineering Majors must take MECHENG 235 as a part of their major requirements
<input checked="" type="checkbox"/>	Enforced Prerequisite (254 char)  Minimum grade requirement:	Enforced Prerequisite (254 char) [MATH 215 or 255 or 285; (C or better, No OP/F)] AND [MECHENG 235 or NAVARCH 235 & MECHENG 240; (C or better, No OP/F)] AND [Fewer than 2 previous elections of MECHENG 320 (incl. grades of W & I)] Minimum grade requirement: C
<input type="checkbox"/>	Credit Exclusions	Credit Exclusions
<input checked="" type="checkbox"/>	<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <b>Course Components</b>  <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         </div> <div style="width: 30%;"> <b>Graded Component</b>  <input checked="" type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/> </div> <div style="width: 30%;"> <b>Terms Typically Offered</b>  <input checked="" type="checkbox"/> Fall  <input checked="" type="checkbox"/> Winter  <input type="checkbox"/> Spring  <input type="checkbox"/> Summer  <input type="checkbox"/> Spring/Summer         </div> </div>	
Cognizant Faculty Member Name: Eric Johnsen <span style="float: right;">Cognizant Faculty Member Title: Associate Chair (Undergrad. Ed.)</span>		

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

Contact Person:

Email:

Phone:

CoE Curriculum

Committee Representative:

*Xiaogan Liang*

Print: Xiaogan Liang

Date: 12/21/2022

CoE Curriculum Committee Chair:

Print:

Date:

Home Department Chair:

*Eric Johnsen*

Print: Eric Johnsen

Date: 12/20/2022

Cross-Listed Department Chair:

*David Dowling*

Print: David Dowling

Date: 12/21/2022

Cross-Listed Department Chair:

Print:

Date:

Cross-Listed Department Chair:

Print:

Date:

<b>DEPARTMENTAL/COLLEGE USE ONLY</b>
--------------------------------------

**Current:****Requested:**Course DescriptionCourse Description

Fluid statics; conservation of mass, momentum and energy in fixed and moving control volumes; steady and unsteady Bernoulli's equation; differential analysis of fluid flow; dimensional analysis and similitude; laminar and turbulent flow; boundary layers; lift and drag; applications to mechanical, marine, biological, environmental, and micro-fluidic systems.

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:

ME 320 is a required class for all MECHENG students.

NA 320 is a NAME UG degree requirement. The new version of this course will also be required. It will cover many but not all of the topics in the current version of NA 320. The topics not covered in the new version of this course will be transferred to NA 321.

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

The goals of the NA 320 & ME 320 modification effort are to: (i) produce a single cross-listed course ME 320/NA 320 that is required for NAME and ME students while (ii) maintaining the technical content of the NAME UG curriculum. The cross listing will allow more efficient and flexible delivery of the undergraduate curriculum in ME and NAME, because ME will not need to provide all the instructors and NAME students will have many more opportunities to take this required course. For example, NAME students will be able to enroll in any of 4 sections (2 fall & 2 winter) of the future cross-listed course each academic year instead of just one section of NA 320 in the fall semester.

The NAME Dept. will support the cross-listed course by supplying one faculty instructor each academic year to teach one of the four sections. The NAME Dept. will typically provide this instructor every fall semester. The cross-listing is an advantage for the ME Dept. because NAME will contribute one instructor per year to the teaching of ME 320/NA 320, and this lowers ME's teaching burden from 4 sections of ME 320 to 3 sections of ME 320/NA 320 each academic year.

The cognizant faculty member in NAME for NA 320 and NA 321 is Prof. Kevin Maki. He will continue as the cognizant faculty member with NAME for ME 320/NA 320. Professors Bernitsas, Dowling, Mahesh, Maki, Pan, and Sareen in NAME are all capable of teaching ME 320/NA 320.

The proposed ME 320/NA 320 course description is essentially identical to that of the current ME 320. The lone difference being the addition of a single word, 'marine', in the listing of application areas to recognize the importance of such applications for NAME students.

The content of the current ME 320 will be retained in the future ME 320/NA 320. However, two adjustments must be made within the NAME curriculum to allow this cross-listing to occur without loss of content in the NAME UG curriculum. First, the current NA 320 is 4 credits while the current ME 320 is three credits, so the current NA 320 will be reduced by one credit through the elimination of the free-surface flow topic. The remainder of the current NA 320 is essentially identical to the current ME 320. And, to ensure that the NAME UG curriculum is maintained, the free surface flow topic and the single credit shed from NA 320 will be transferred to a new 4-credit version of NA 321. Overall, these changes do not alter the contents of the ME or NAME curricula, but do provide advantages for both departments. Therefore, these proposed changes should be approved without delay.

## ME 320 – section 002, Fall 2022 Fluid Mechanics I (3 credits)

*This syllabus and course policies are subject to change at any time. Students will be notified of major changes in course policies. Last updated 2022-09-08 14:15:42.*

### Instructor

Eric Johnsen, Associate Professor of Mechanical Engineering

Office: 2380C G.G. Brown

Email: [ejohnsen@umich.edu](mailto:ejohnsen@umich.edu)

Office hours (zoom link: <https://umich.zoom.us/j/93035851752> with passcode 965052):

Mondays 10:30-11:30am (zoom)

Wednesdays 1:00-2:00pm (zoom)

### GSI

Baudouin Fonkwa Kamga

Email: [baudfonk@umich.edu](mailto:baudfonk@umich.edu)

Office hours (zoom link: <https://umich.zoom.us/j/6688357145> with passcode 3202022):

Mondays 1-5pm (zoom)

Tuesdays 7-8pm (104 EWRE)

Wednesdays 7-8pm (104 EWRE)

Thursday 10am-noon (zoom)

Friday 3-5pm (zoom)

### Objectives and outcomes

Fluid mechanics is a fundamental topic in mechanical engineering and many related areas. The overall objective of this course is to provide a qualitative and quantitative understanding of the physical mechanisms in fluid flow, in order to be able to analyze and predict flow fields of interest.

The specific objectives of the course are to teach students:

- basic fluid properties, flow forces, and flow regimes,
- how force is transmitted in static fluids,
- conservation of mass, momentum, and energy in fixed, deforming, and moving control volumes
- the use and limitations of steady and unsteady Bernoulli equation
- conservation of mass and momentum through differential analysis in simple geometries
- techniques of dimensional analysis, similitude, and modeling, and introduce the important non-dimensional groups in fluid mechanics
- application of the above concepts to internal and external flows, and introduce the boundary layer concept, lift and drag, flow separation, and drag reduction fundamentals
- examples of applications of above concepts in mechanical, biological, environmental, and micro-fluidic systems.

The specific outcomes for the students include the ability to:

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ME 320 – Fluid Mechanics I

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- identify or predict the flow regime in a given engineering system based on consideration of the governing non-dimensional groups
- calculate the hydrostatic forces and moments on planar and curved submerged and floating surfaces
- construct an appropriate control volume for a given engineering system and apply the principles of conservation of mass, momentum, and energy to this control volume
- decide when appropriate to use ideal flow concepts and the Bernoulli equation
- present data or governing equations in non-dimensional form, design experiments, and perform model studies
- solve for internal flow in pipes and channels through simple solutions of the Navier-Stokes equations, the Moody chart, or the head-loss equation
- solve for external flow, evaluate lift and drag, know when there is possibility of flow separation, apply streamlining concepts for drag reduction by using experimental correlations
- understand how fluid mechanics applies to mechanical, biological, environmental, and micro-fluidic systems.

### Website

Business related to the course (syllabus, HW sets, handouts, lectures, etc.) will be handled through Canvas: <https://canvas.umich.edu/gateway>

### Pre-requisites

MATH 215, MECHENG 235, MECHENG 240.

### Logistics

Lecture times are Tuesdays/Thursdays 3:00-4:20pm in room 1200 EECS. Attendance and engagement is a key component to success in this course. The modality for the course is in-person; in-person attendance is strongly recommended. Nevertheless, to accommodate sick students and those at high risk for severe illness, lectures will be complemented by a zoom simulcast, which will be recorded and posted to Canvas. Lecture notes and other relevant materials will also be uploaded to Canvas.

All course materials provided by the instructor are protected by U.S. copyright law. Course materials (notes, slides, scripts, homework sets/solutions, tests) may not be distributed beyond current course participants without the instructor's written consent.

As part of their participation in this course, students may be recorded. Students who do not wish to be recorded should contact the instructor the first week of class (or as soon as they enroll in the course) to discuss alternative arrangements. Class activities may not be recorded by students without the written permission of the instructor.

### Grading

The deliverables for this course include homework sets, in-class assignments, quizzes, and a final exam:

- HW sets: 10%

- In-class assignments: 20%
- Two quizzes: 20% each
- Final exam: 30%

**HW sets.** Twelve HW sets will be assigned, ten of which will be collected (HW sets 1-10, see course schedule for deadlines). Each HW set will consist of five problems. HW sets will be posted at least one week prior to their due date (Thursdays by 5:00pm) and must be submitted on Canvas. Solutions will be posted that same Thursday evening. No late submissions will be accepted. The lowest score will be dropped in the calculation of the grade.

HW sets will be graded based on a two-step process: (i) submissions will be graded based on a 0-2 scale (0: not attempted; 2: attempted); (ii) students may resubmit their work by 5:00pm the next Monday, which will be graded based on a 0-1 scale (0: incorrect; 1: correct). Therefore, students may receive up to 3 points per problem. Illegible submissions will be assigned 0 points at either stage.

Intellectual collaboration with current ME 320 students is allowed and encouraged; such discussions should be to the benefit of all parties involved. However, the actual written submission must be completed independently and must reflect the student's own understanding of the material. Other collaborations are not allowed. For the resubmission, students are allowed and encouraged to use the posted solutions; however, students must write their own submission.

**In-class assignments.** Approximately a dozen in-class assignments consisting of one problem each will be administered throughout the semester during the lecture time. The problem will be designed so that it can be solved in 5 minutes, though students will have 10 minutes to complete it. Submissions will be graded based on a 0-1 scale (0: not attempted; 1: attempted). The lowest two scores will be dropped in the calculation of the grade.

It is expected that in-person students will have paper and pencils to complete the assignment. Remote students must send their submission by email to the GSI within the allotted time; late assignments (per email stamp) will not be accepted. These assignments may take place at any time within the lecture time. Students may use their notes and textbooks, but may not use online resources.

**Quizzes and final exam.** The quizzes will take place on Thursday evenings; lecture on that same Thursday will be canceled. The final exam will take place according to the date/time prescribed by the registrar.

All quizzes and exams cover material up to the date of the quiz/exam. Quiz 1 will include material up to and including hydrostatics (HW sets 1-3); quiz 2 will include material up to and including integral analysis, but will emphasize material covered since the first quiz (HW sets 4-7). The quizzes/exams will be open book and a hand-written summary sheet will be permitted. Course notes, homework solutions, and electronic devices are not allowed except to access electronic copies of the textbook. Solutions will be posted on the instructor's door. Written regrading requests will be accepted up to one week after copies are returned.

Scheduling conflicts must be reported by email to the instructor no later than two weeks before the exam date. Quizzes/exams missed for medical reasons will require documentation. Make up exams will be oral.

**Recitation sessions**

Tuesdays and Wednesdays 6-7pm in 104 EWRE (zoom link: <https://umich.zoom.us/j/6688357145> with passcode 3202022).

Recitation sessions are optional. The GSI will solve problems related to those assigned in the homework sets and answer any questions during the first hour; the recitation hour will be followed by an hour of office hours. The same problems will be solved at both recitations.

**Honor code**

All class policies are governed by the CoE honor code, by which the students are expected to adhere:

<http://elc.engin.umich.edu/wp-content/uploads/sites/19/2019/03/Honor-Code-Pamphlet-2018.pdf>

**Textbook**

Though there is no required textbook, it is strongly suggested that the students get a copy of one of the following textbooks:

- A. L. Gerhart, J. I. Hochstein, and P. M. Gerhart, *Munson, Young and Okiishi's Fundamentals of Fluid Mechanics*, 9th Edition
- R. W. Fox, A. T. McDonald, and J. W. Mitchell, *Fox and McDonald's Introduction to Fluid Mechanics*, 10th Edition

Past editions and other textbooks may be viable options as well, but students are responsible for discrepancies from the suggested texts.

## ME 320 – Fluid Mechanics I

**Schedule**

Lec	Date	Read*	Topic(s)	HW <sup>†</sup>
1	Tu Aug 30	Ch. 1	Logistics and introduction	
2	Th Sep 1	Ch. 1	Properties of fluids	0**
3	Tu Sep 6	Ch. 2	Hydrostatics: basic equation	
4	Th Sep 8	Ch. 2	Hydrostatics: manometry	1
5	Tu Sep 13	Ch. 2	Hydrostatics: forces on submerged objects	
6	Th Sep 15	Ch. 2	Hydrostatics: forces on non-rectangular/planar objects	2
7	Tu Sep 20	Ch. 4	Kinematics: velocity and acceleration	
8	Th Sep 22	Ch. 4	Kinematics: stream/streak/pathlines	3
–	Tu Sep 27		Quiz # 1 review (in class)	
–	Th Sep 29		<b>Quiz # 1 (no lecture location/time tbd)</b>	
9	Tu Oct 4	Ch. 5	Integral analysis: basic notions	
10	Th Oct 6	Ch. 5	Integral analysis: mass conservation	4
11	Tu Oct 11	Ch. 5	Integral analysis: momentum balance	
12	Th Oct 13	Ch. 5,3	Integral analysis: momentum balance and Bernoulli	5
–	Tu Oct 18		<b>No lecture (Fall break)</b>	
13	Th Oct 20	Ch. 5	Integral analysis: energy balance	6
14	Tu Oct 25	Ch. 6	Differential analysis: kinematics	
15	Th Oct 27	Ch. 6	Differential analysis: Navier-Stokes equation	7
–	Tu Nov 1		Quiz # 2 review (in class)	
–	Th Nov 3		<b>Quiz # 2 (no lecture, location/time TBD)</b>	
16	Tu Nov 8	Ch. 6	Differential analysis: Navier-Stokes solutions	
17	Th Nov 10	Ch. 7	Dimensional analysis: basic notions	8
18	Tu Nov 15	Ch. 7	Dimensional analysis: application	
19	Th Nov 17	Ch. 7	Similitude and model design	9
20	Tu Nov 22	Ch. 6,3	Bernoulli and potential flow	
–	Th Nov 24		<b>No lecture (Thanksgiving)</b>	
21	Tu Nov 29	Ch. 8	Internal flows	
22	Th Dec 1	Ch. 9	External flows: boundary layers	10
23	Tu Dec 6	Ch. 9	External flows: lift/drag	
–	Th Dec 8		Final review	11**
–	Th Dec 15		<b>Final exam 8:00-10:00am</b>	

\* Readings are based on Munson, Young and Okiishi's Fundamentals of Fluid Mechanics, 9th Edition

\*\* HW0 and HW11 are assigned for self-study only and will not be collected



**Additional information**

The instructor considers this classroom to be a place where you will be treated with respect. Individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability, and other visible and nonvisible differences are welcome. Members of this class are all expected to contribute to a respectful, welcoming, and inclusive environment for every other member of the class. If in lecture or smaller interactions the instructor accidentally use language that creates offense or discomfort to you, please contact the instructor to help him understand and avoid repeating this mistake.

Students may experience stressors that can impact both their academic experience and their personal well-being. These may include pressures and challenges associated with academics, relationships, mental health, alcohol or other drugs, identities, finances, etc. If the source of your stressors is academic, please contact the instructor to find solutions together. For personal concerns, U-M offers a variety of resources, many which are listed on the Resources for Student Well-being webpage: <https://wellbeing.studentlife.umich.edu>

U-M is committed to providing equal opportunity for participation in all classes, programs, services and activities. Requests for accommodations by persons with disabilities may be made by contacting the Services for Students with Disabilities (SSD) Office (G664 Haven Hall, 734-763-3000). Once eligibility for an accommodation has been determined a verified individual services accommodation (VISA) form will be issued. Please present this form to the instructor at the beginning of the term, or at least two weeks prior to the need for the accommodation.

**COVID-19 policy**

As of the first day of the semester, the COVID-19 Community Level in Washtenaw County is High. CDC-recommends the following actions:

*Wear a mask indoors in public and on public transportation. Stay up to date with COVID-19 vaccines. Get tested if you have symptoms. If you are at high risk for severe illness, consider taking additional precautions.*

The CDC further states that:

*[...] you should isolate from others when you have COVID-19. You should also isolate if you are sick and suspect that you have COVID-19 but do not yet have test results. If your results are positive, follow the full isolation recommendations [listed on <https://www.cdc.gov/coronavirus/2019-ncov/your-health/isolation.html>]*

To accommodate students who are sick or at high risk for severe illness, lecture recordings are provided.

# University of Michigan

## Fall 2021 Instructor Report With Comments

### MECHENG 320-001: Fluid Mech I

#### Rayhaneh Akhavan

28 out of 73 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	13	3	0	0	0	4.3	4.5	4.5
My interest in the subject has increased because of this course. (Q1632)	3	13	6	2	4	0	3.7	4.2	4.2
I knew what was expected of me in this course.(Q1633)	11	13	3	1	0	0	4.3	4.5	4.4
I had a strong desire to take this course.(Q4)	2	6	15	4	0	0	3.1	4.0	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)	0	0	20	7	1	0	2.8	3.0	2.9

#### Responses to University-wide questions about the instructor:

	SA	A	N	D	SD	N/A	Your Median	Univ-wide Median	School/College Median
Rayhaneh Akhavan seemed well prepared for class meetings.(Q230)	17	7	3	1	0	0	4.7	4.8	4.7
Rayhaneh Akhavan explained material clearly.(Q199)	7	12	4	2	3	0	3.9	4.7	4.7
Rayhaneh Akhavan treated students with respect.(Q217)	13	11	3	1	0	0	4.4	4.9	4.8

#### Responses to questions about the course:

	SA	A	N	D	SD	N/A	Your Median
Overall, this was an excellent course. (Q1)	6	9	8	3	0	0	3.7

#### Responses to questions about the instructor:

	SA	A	N	D	SD	N/A	Your Median
Overall, Rayhaneh Akhavan was an excellent teacher. (Q2)	8	12	3	2	2	1	4.0

The medians are calculated from Fall 2021 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 upper division with enrollment of 16 to 74 in College of Engineering.

# University of Michigan

## Fall 2021 Instructor Report With Comments

### MECHENG 320-002: Fluid Mech I

#### Aaron Towne

55 out of 64 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	23	3	0	0	0	4.6	4.5	4.5
My interest in the subject has increased because of this course. (Q1632)	16	24	7	6	0	0	4.1	4.2	4.2
I knew what was expected of me in this course.(Q1633)	28	21	5	1	0	0	4.5	4.5	4.4
I had a strong desire to take this course.(Q4)	7	11	24	9	1	0	3.2	4.0	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)	1	3	36	12	3	0	2.8	3.0	2.9

#### Responses to University-wide questions about the instructor:

	SA	A	N	D	SD	N/A	Your Median	Univ-wide Median	School/College Median
Aaron Towne seemed well prepared for class meetings.(Q230)	42	12	1	0	0	0	4.8	4.8	4.7
Aaron Towne explained material clearly.(Q199)	25	19	9	2	0	0	4.4	4.7	4.7
Aaron Towne treated students with respect.(Q217)	45	10	0	0	0	0	4.9	4.9	4.8

#### Responses to questions about the course:

	SA	A	N	D	SD	N/A	Your Median
Overall, this was an excellent course. (Q1)	20	20	11	2	1	0	4.2

#### Responses to questions about the instructor:

	SA	A	N	D	SD	N/A	Your Median
Overall, Aaron Towne was an excellent teacher. (Q2)	25	22	7	0	1	0	4.4

#### Aaron Towne cares about my learning.

(custom question added by the instructor)

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	N/A	Your Median
36	16	2	0	0	0	4.8

# University of Michigan

## Winter 2022 Instructor Report With Comments

### MECHENG 320-001: Fluid Mech I

#### Jesse Capecelatro

35 out of 72 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)	15	17	2	0	0	0	4.4	4.6	4.5
My interest in the subject has increased because of this course. (Q1632)	7	16	9	3	0	0	3.8	4.2	4.2
I knew what was expected of me in this course. (Q1633)	13	18	2	2	0	0	4.3	4.6	4.4
I had a strong desire to take this course. (Q4)	3	13	16	3	0	0	3.4	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)	0	4	24	5	0	0	3.0	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
Jesse Capecelatro seemed well prepared for class meetings. (Q230)	20	10	3	2	0	0	4.6	4.8	4.7
Jesse Capecelatro explained material clearly. (Q199)	19	9	4	2	0	0	4.6	4.7	4.7
Jesse Capecelatro treated students with respect. (Q217)	30	3	2	0	0	0	4.9	4.8	4.8

#### Responses to questions about the course:

	SA	A	N	D	SD	N/A	Your Median
Overall, this was an excellent course. (Q1)	11	15	6	2	0	0	4.1

#### Responses to questions about the instructor:

	SA	A	N	D	SD	N/A	Your Median
Overall, Jesse Capecelatro was an excellent teacher. (Q2)	17	14	2	2	0	0	4.5

The medians are calculated from Winter 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 upper division with enrollment of 16 to 74 in College of Engineering.

### Written Comments

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

Comments
N/A

# University of Michigan

## Winter 2022 Instructor Report With Comments

### MECHENG 320-002: Fluid Mech I

#### Solomon Adera

56 out of 57 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	26	0	1	0	0	4.5	4.6	4.5
My interest in the subject has increased because of this course. (Q1632)	13	27	10	6	0	0	3.9	4.2	4.2
I knew what was expected of me in this course.(Q1633)	26	27	2	1	0	0	4.4	4.6	4.4
I had a strong desire to take this course.(Q4)	5	16	20	12	0	1	3.2	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)	2	11	42	1	0	0	3.1	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
Solomon Adera seemed well prepared for class meetings.(Q230)	27	26	3	0	0	0	4.5	4.8	4.7
Solomon Adera explained material clearly.(Q199)	15	32	9	0	0	0	4.1	4.7	4.7
Solomon Adera treated students with respect.(Q217)	42	10	3	0	0	0	4.8	4.8	4.8

#### Responses to questions about the course:

	SA	A	N	D	SD	N/A	Your Median
Overall, this was an excellent course. (Q1)	19	26	11	0	0	0	4.2

#### Responses to questions about the instructor:

	SA	A	N	D	SD	N/A	Your Median
Overall, Solomon Adera was an excellent teacher. (Q2)	30	22	3	0	0	0	4.6

The medians are calculated from Winter 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 upper division with enrollment of 16 to 74 in College of Engineering.

### Written Comments

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

Comments
Professor Adera highly respected his students and would always modify his teaching methods for the best of his students.



## 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: 2022-09-21

Effective Term: Fall 2023

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

#### CURRENT LISTING

#### REQUESTED LISTING

<input type="checkbox"/>	Dept (Home): Mechanical Engineering Subject: MECHENG Catalog: 320			Dept (Home): Subject: Catalog:		
<input type="checkbox"/>	<input type="checkbox"/> Course is Cross-Listed with Other Departments			<input type="checkbox"/> Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
<input type="checkbox"/>						
<input type="checkbox"/>	Course Title (full title) Fluid Mechanics I			Course Title (full title)		
<input type="checkbox"/>	Abbreviated Title (20 char) Fluid Mech I			Abbreviated Title (20 char)		
<input type="checkbox"/>	Course Description (Please limit to 50 words and attach separate sheet if necessary) Fluid statics; conservation of mass, momentum, and energy in fixed and moving control volumes; steady and unsteady Bernoulli's equation; differential analysis of fluid flow; dimensional analysis and similitude; laminar and turbulent flow; boundary layers; lift and drag; applications to mechanical, biological, environmental, and micro-fluidic systems.					
<input type="checkbox"/>	Full Term Credit Hours Undergraduate Min: 3      Graduate Min: Undergraduate Max: 3      Graduate Max:			Half Term Credit Hours Undergraduate Min:      Graduate Min: Undergraduate Max:      Graduate Max:		
<input 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: Mechanical Engineering      Catalog: 320	
<input type="checkbox"/>	<div>Grading Basis</div> <div> <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       </div> <div>Grading</div> <div> <input type="checkbox"/> Not for Credit         <input type="checkbox"/> Not for Degree Credit         <input type="checkbox"/> Degree Credit Only       </div>
	<div>Add Consent</div> <div> <input type="checkbox"/> Department Consent         <input type="checkbox"/> Instructor Consent         <input checked="" type="checkbox"/> No Consent       </div>
	<div>Drop Consent</div> <div> <input type="checkbox"/> Department Consent         <input type="checkbox"/> Instructor Consent         <input checked="" type="checkbox"/> No Consent       </div>

	CURRENT LISTING	REQUESTED LISTING
<input type="checkbox"/>	Advisory Prerequisite (254 char)	Advisory Prerequisite (254 char)
<input type="checkbox"/>	Enforced Prerequisite (254 char) [MATH 215 or 255 or 285; (C or better, No OP/F)] AND [MECHENG 235 & 240; (C or better, No OP/F)] AND [Fewer than 2 previous elections of MECHENG 320 (incl. grades of W & I)] Minimum grade requirement:	Enforced Prerequisite (254 char)  Minimum grade requirement:
<input type="checkbox"/>	Credit Exclusions	Credit Exclusions
<input type="checkbox"/>	<div>Course Components</div> <div> <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         </div>	<div>Graded Component</div> <div> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div>
		<div>Terms Typically Offered</div> <div> <input checked="" type="checkbox"/> Fall           <input checked="" type="checkbox"/> Winter           <input type="checkbox"/> Spring           <input type="checkbox"/> Summer           <input type="checkbox"/> Spring/Summer         </div>
Cognizant Faculty Member Name: Eric Johnsen      Cognizant Faculty Member Title: Associate Chair (Undergrad Ed.)		

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

Contact Person:

Email:

Phone:

CoE Curriculum

Committee Representative:

*Xiaogan Liang*

Print: Xiaogan Liang

Date: 12/21/2022

CoE Curriculum Committee Chair:

Print:

Date:

Home Department Chair:

*Eric Johnsen*

Print: Eric Johnsen

Date: 12/21/2022

Cross-Listed Department Chair:

Print:

Date:

Cross-Listed Department Chair:

Print:

Date:

Cross-Listed Department Chair:

Print:

Date:

<b>DEPARTMENTAL/COLLEGE USE ONLY</b>
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**Current:****Requested:**Course Description

Fluid statics; conservation of mass, momentum, and energy in fixed and moving control volumes; steady and unsteady Bernoulli's equation; differential analysis of fluid flow; dimensional analysis and similitude; laminar and turbulent flow; boundary layers; lift and drag; applications to mechanical, biological, environmental, and micro-fluidic systems.

Course DescriptionClass Length

Full term

Class LengthContact hours (lecture):

3

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

Home dept

Describe how this course fits with the degree requirements:Special resources of facilities required for this course:Supporting statement:

Course submitted for deletion as part of process to crosslist new NA 320 with ME 320.





## 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

### ☒ CHECK APPROPRIATE BOXES FOR ALL CHANGES

#### Action Requested

- ☐ New Course  
☐ Modification of Existing Course  
☒ Deletion of Existing Course

Date of Submission: 2022-10-07

Effective Term: Fall 2023

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

#### CURRENT LISTING

#### REQUESTED LISTING

<input type="checkbox"/>	Dept (Home): Naval Arch & Marine Engin Subject: NAVARCH Catalog: 320			Dept (Home): Subject: Catalog:		
<input type="checkbox"/>	<input type="checkbox"/> Course is Cross-Listed with Other Departments			<input type="checkbox"/> Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
<input type="checkbox"/>	Course Title (full title) Marine Hydro I			Course Title (full title)		
<input type="checkbox"/>	Abbreviated Title (20 char) MAR HYDR I			Abbreviated Title (20 char)		
<input type="checkbox"/>	Course Description (Please limit to 50 words and attach separate sheet if necessary) Concepts and basic equations of marine hydrodynamics. Similitude and dimensional analysis, basic equations in integral form, continuity, and Navier-Stokes equations. Ideal fluid flow, Euler's equations, Bernoulli equation, free surface boundary value problems. Laminar and turbulent flows in pipes and around bodies.					
<input type="checkbox"/>	Full Term Credit Hours			Half Term Credit Hours		
	Undergraduate Min: 4	Graduate Min:		Undergraduate Min:	Graduate Min:	
<input type="checkbox"/>	Undergraduate Max: 4	Graduate Max:		Undergraduate Max:	Graduate Max:	
	Course Credit Type Undergraduate Student					
<input type="checkbox"/>	Repeatability					
	<input type="checkbox"/> Course is Repeatable for Credit Maximum number of repeatable credits:			<input type="checkbox"/> Course is Y graded <input type="checkbox"/> Can be taken more than once in the same term		

Subject: Naval Arch &amp; Marine Engin Catalog: 320

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

**CURRENT LISTING****REQUESTED LISTING**

<input type="checkbox"/>	Advisory Prerequisite (254 char) "MATH 215, and NA 210 or ME 211 or ME 240, or permission of instructor. ""C-"" or Better"	Advisory Prerequisite (254 char)																					
<input type="checkbox"/>	Enforced Prerequisite (254 char) Minimum grade requirement:	Enforced Prerequisite (254 char) Minimum grade requirement:																					
<input type="checkbox"/>	Credit Exclusions	Credit Exclusions																					
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Cognizant Faculty Member Name: Kevin Maki		Cognizant Faculty Member Title: Assoc Professor																					

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

Contact Person:

Email:

Phone:

CoE Curriculum

Committee Representative:



Print: Yulin Pan

Date: 12/21/22

CoE Curriculum Committee Chair:

Print:

Date:

Home Department Chair:



Print: David Dowling

Date: 12/21/22

Cross-Listed Department Chair:

Print:

Date:

Cross-Listed Department Chair:

Print:

Date:

Cross-Listed Department Chair:

Print:

Date:

<b>DEPARTMENTAL/COLLEGE USE ONLY</b>
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**Current:****Requested:**Course Description

Concepts and basic equations of marine hydrodynamics. Similitude and dimensional analysis, basic equations in integral form, continuity, and Navier-Stokes equations. Ideal fluid flow, Euler's equations, Bernoulli equation, free surface boundary value problems. Laminar and turbulent flows in pipes and around bodies.

Course DescriptionClass Length

Full term

Class LengthContact hours (lecture):

4

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:

Degree Requirement

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

Following recommendation of College Curriculum Committee so that current NA 320 will be deleted as part of process to crosslist NA 320 with ME 320



## 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

### ☒ CHECK APPROPRIATE BOXES FOR ALL CHANGES

#### Action Requested

- ☐ New Course  
☒ Modification of Existing Course  
☐ Deletion of Existing Course

Date of Submission: 2022-10-07

Effective Term: Fall 2023

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

#### CURRENT LISTING

#### REQUESTED LISTING

<input type="checkbox"/>	Dept (Home): Naval Arch & Marine Engin Subject: NAVARCH Catalog: 321			Dept (Home): Naval Arch & Marine Engin Subject: NAVARCH Catalog: 321		
<input type="checkbox"/>	<input type="checkbox"/> Course is Cross-Listed with Other Departments			<input type="checkbox"/> Course is Cross-Listed with Other Departments		
	Department	Subject	Catalog Number	Department	Subject	Catalog Number
<input checked="" type="checkbox"/>	Course Title (full title) Marine Hydrodynamics II			Course Title (full title) Marine Hydrodynamics		
<input checked="" type="checkbox"/>	Abbreviated Title (20 char) Marine Hydro II			Abbreviated Title (20 char) Marine Hydro		
<input checked="" type="checkbox"/>	Course Description (Please limit to 50 words and attach separate sheet if necessary) Ideal and viscous fluid theory applied to marine systems. Ship resistance components. Resistance prediction from model testing and standard series. Two-dimensional and three-dimensional airfoil theory. Propeller geometry, design and matching. Hull-propeller interaction, propeller charts, powering prediction. Unsteady marine hydrodynamics: free surface flow, wave loads, seakeeping and transport of pollutants.					
<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 type="checkbox"/>	Course Credit Type Undergraduate Student					
<input type="checkbox"/>	Repeatability <input type="checkbox"/> Course is Repeatable for Credit Maximum number of repeatable credits:					
	<input type="checkbox"/> Course is Y graded <input type="checkbox"/> Can be taken more than once in the same term					

Subject: Naval Arch &amp; Marine Engin Catalog: 321

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

**CURRENT LISTING****REQUESTED LISTING**

<input checked="" type="checkbox"/>	Advisory Prerequisite (254 char) NA 320	Advisory Prerequisite (254 char) NA 320 or ME 320 or equivalent																					
<input type="checkbox"/>	Enforced Prerequisite (254 char)	Enforced Prerequisite (254 char)																					
<input type="checkbox"/>	Minimum grade requirement:	Minimum grade requirement:																					
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CoE Curriculum

Committee Representative:



Print:

Yulin Pan

Date: 12/21/22

CoE Curriculum Committee Chair:

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Date:

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Date:

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Print:

Date:

<b>DEPARTMENTAL/COLLEGE USE ONLY</b>
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**Current:****Requested:**Course Description

Ideal and viscous fluid theory applied to marine systems. Ship resistance components. Resistance prediction from model testing and standard series. Two-dimensional and three-dimensional airfoil theory. Propeller geometry, design and matching. Hull-propeller interaction, propeller charts, powering prediction. Unsteady marine hydrodynamics: wave loads, seakeeping and transport of pollutants.

Class Length

Full term

Contact hours (lecture):

3

Contact hours (recitation)Contact hours (lab)Course Description

Ideal and viscous fluid theory applied to marine systems. Ship resistance components. Resistance prediction from model testing and standard series. Two-dimensional and three-dimensional airfoil theory. Propeller geometry, design and matching. Hull-propeller interaction, propeller charts, powering prediction. Unsteady marine hydrodynamics: free surface flow, wave loads, seakeeping and transport of pollutants

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:

The current NA 321 is a required course for NAME UG students. The proposed NA 321 will also be required. The proposed NA 321 will include the free surface flow topic that was shed from NA 320 so that it could be cross listed with ME 320. Thus, the overall credit count, and topical content requirements for NAME UG students are unchanged.

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

To ensure that the NAME UG curriculum is maintained, the free surface flow topic and the single credit shed from the cross-listing of ME 320/NA 320 will be transferred back to a new 4-credit version of NA 321. Overall, these changes do not alter the contents of the ME or NAME curricula, but do provide advantages for both departments. Therefore, these proposed changes should be approved without delay.