



1. Teaching Team

Instructor:

Prof. Dimitris Assanis

Email: dimitris.assanis@stonybrook.edu - use [MEC 305] in subject line

Office Hours: Mon 1:00 - 3:00 PM (LE 131)

Fri 1:00 - 3:00 PM (LE 131)

Teaching Assistants: Mr. Mahmoud Koraiem, mahmoud.koraiem@stonybrook.edu

Office Hours: Mon 4:00 - 6:00 PM (Zoom)

Fri 4:00 - 6:00 PM (Zoom)

Mr. Ioannis (Giannis) Nikiforakis, ioannis.nikiforakis@stonybrook.edu

Office Hours: Wed 1:00 - 2:00 PM (ENGINEERING 106)

Thu 5:00 - 8:00 PM (ENGINEERING 106)

Lectures: M W F 11:45 AM -12:40 PM (ENGINEERING 143) –attendance required

Recitation-01: M 09:15 - 10:10 AM (STALLER CTR M0113) – attendance required

Recitation-02: W 09:15 - 10:10 AM (STALLER CTR M0113) – attendance required

Slack Channel: https://join.slack.com/t/stonybrook-fog8862/shared_invite/zt-12idvuaeo-xe5WAeBUK5nWehluKSHkg

Class Zoom Link for virtual Office Hours (when available):

<https://stonybrook.zoom.us/j/95978035614?pwd=eFJic3kvWUo5a2M4U29BdE5DWjk2QT09>

2. Course Goal

The goal of the course is to introduce students to the fundamentals of heat and mass transfer as well as unique application

3. Pre-Requisites

MEC 301 and MEC 364; MEC 102, or ESG 111, or ESE 124, or CSE 114 or 130 or BME 120

4. Course Description

Fundamental laws of momentum, heat, and mass transfer, and the corresponding transport coefficients. Principles of steady-state and transient heat conduction in solids. Laminar and turbulent boundary layer flows, thermal radiation, and radiation heat transfer between surfaces. Applications to heat transfer equipment.

Course Outline: 1. Basic Concepts of Thermodynamics and Heat Transfer (Chapter 1)

2. Heat Conduction

Heat Conduction Equation (Chapter 2)

Steady Heat Conduction (Chapter 3)

Transient Heat Conduction (Chapter 4)



3. Convection
 - Fundamentals of Convection (Chapter 6)
 - Forced Convection (Chapters 7 and 8)
 - Natural Convection (Chapter 9)
4. Radiation Heat Transfer (Chapters 12 and 13)

5. **Course Schedule (section & chapter numbers are based on textbook)**

24-Jan	Mon	1	Introduction, Syllabus, essential formulations		
26-Jan	Wed	1	Heat transfer mechanisms: conduction,		
28-Jan	Fri	1	Heat transfer mechanisms: convection, radiation	Homework 1: Intro to Heat Transfer	
31-Jan	Mon	2	Heat Conduction Equation - Day 1		
2-Feb	Wed	2	Heat Conduction Equation - Day 2		
4-Feb	Fri	2	Heat Conduction Equation - Day 3	Homework 2: Heat Conduction Eq.	HW #1
7-Feb	Mon	3	Steady Heat Conduction - Day 1		
9-Feb	Wed	3	Steady Heat Conduction - Day 2		
11-Feb	Fri	3	Steady Heat Conduction - Day 3	Homework 3: Steady Heat Conduction	HW #2
14-Feb	Mon		Fins - General Fin Equation		
16-Feb	Wed		Fins - Fin Boundary Conditions		
18-Feb	Fri		Midterm #1 Review		HW #3
21-Feb	Mon		Midterm #1 (Heat Eq & Steady Conduction) - 45 min	Homework 4: Fins	
23-Feb	Wed	3	Fins - Sample Problems		
25-Feb	Fri	4	Transient Heat Conduction - Lumped System Analysis		
28-Feb	Mon	4	Transient Heat Conduction - Different Geometries		HW #4
2-Mar	Wed	4	Transient Heat Conduction - Semi-Infinite Solids	Homework 5: Transient Heat Conduction	
4-Mar	Fri	6	Fundamentals of Convection - Day 1		
7-Mar	Mon		Midterm #2 Review		
9-Mar	Wed	6	Fundamentals of Convection - Day 2	Homework 6: Convection Fundamentals	HW #5
11-Mar	Fri		Midterm #2 (Fins & Transient Conduction) - 45 min		
14-Mar	Mon		Spring Break (No Class)		
16-Mar	Wed		Spring Break (No Class)		
18-Mar	Fri		Spring Break (No Class)		
21-Mar	Mon	7	External Forced Convection - Day 1		
23-Mar	Wed	7	External Forced Convection - Day 2		HW #6
25-Mar	Fri	7	External Forced Convection - Day 3	Homework 7: External Convection	
28-Mar	Mon	8	Internal Forced Convection - Day 1		
30-Mar	Wed	8	Internal Forced Convection - Day 2		
1-Apr	Fri	8	Internal Forced Convection - Day 3	Homework 8: Internal Convection	HW #7
4-Apr	Mon	9	Natural Convection - Day 1		
6-Apr	Wed	9	Natural Convection - Day 2		
8-Apr	Fri	9	Natural Convection - Day 3	No Homework Assigned	HW #8
11-Apr	Mon		Midterm #3 Review		
13-Apr	Wed		Midterm #3 (Forced Convection & Heat-Xs) - 45 min	Homework 9: Natural Convection	
15-Apr	Fri	10	Boiling / Condensation		
18-Apr	Mon	12	Fundamentals of Thermal Radiation - Day 1		
20-Apr	Wed	12	Fundamentals of Thermal Radiation - Day 2	Homework 10: Fund. of Thermal Rad.	HW #9
22-Apr	Fri	12	Fundamentals of Thermal Radiation - Day 3		
25-Apr	Mon	13	Radiation Heat Transfer - Day 1		
27-Apr	Wed	13	Radiation Heat Transfer - Day 2	Homework 11: Radiation Heat Transfer	HW #10
29-Apr	Fri	13	Radiation Heat Transfer - Day 3		
2-May	Mon	14	Mass Transfer - Day 1		
4-May	Wed	14	Mass Transfer - Day 2		HW #11
6-May	Fri		Last Day of Class - Final Exam Review		
13-May	Wed		Final Exam (Comprehensive) - 11:15AM - 1:45PM - 2h30m		



6. Required Course Textbooks and Online Homework System

The official textbook for this course is:

- Yunus Cengel and Afshin Ghajar, *Heat and Mass Transfer: Fundamentals and Applications*, 6th Ed., McGraw-Hill, 2020.

For this course you will be required to utilize McGraw-Hill Education Connect® access (~\$100) for Connect-Semester Online Access or Access Card for Heat and Mass Transfer: Fundamentals & Applications, 6e edition by Cengel and Ghajar. The Connect Access can be purchased as a bundle which includes the eBook for the duration of the access term or a loose-leaf textbook. You are not required to have a printed copy.

Connect Bundles:

Connect + Textbook Rental (online PDF)
ISBN10: 1260858251 | ISBN13: 9781260858259

Connect + Loose Leaf (paper copy)
ISBN10: 1260699323 | ISBN13: 9781260699326

To access the McGraw Hill Connect, sign into Blackboard and click on Course Tools from the left menu and then on McGraw-Hill Higher Education Tools/ McGraw-Hill Connect and click on Go to My Connect Section. Next, you will enter your access code: XXXX-XXXX-XXXX-XXXX-XXXX on the right under 'Use Connect Code' and click Redeem. This will provide you with one-semester access. Our McGraw Hill Connect section direct link: <https://connect.mheducation.com/class/d-assanis-mec-305--spring-2022>

7. Grading

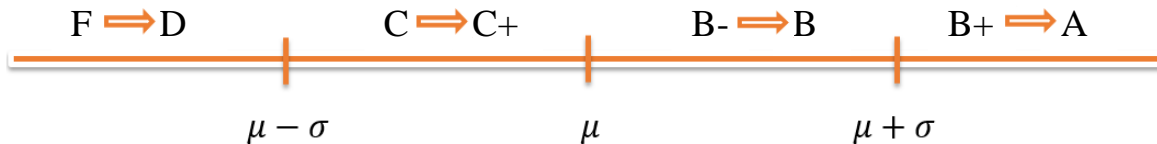
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|----------------|-----|---|
| 1. Attendance | 1% | (Required; randomly checked at recitation/lecture) |
| 2. Homework | 9% | (Required; McGraw Hill Connect platform) |
| 3. Midterm I | 18% | Monday, February 21 st , 2022 (Required; Modality TBD) |
| 4. Midterm II | 18% | Friday, March 11 th , 2022 (Required; Modality TBD) |
| 5. Midterm III | 18% | Wednesday, April 13 th , 2022 (Required; Modality TBD) |
| 6. Final Exam | 36% | Tuesday, May 13 th , 2022 (Required & Comp.; Modality TBD) |

Above distributions are subject to minor adjustment. Question(s) on graded homework/exam will be accepted only for one week after posting of scores.

Your final letter grade maybe be curved (only to improve) and will be decided based on



the above weights and your relative placement in the class. The following scale shows roughly what your final letter grade range might look like, where μ is the average, and σ is the standard deviation.



8. Homework

Homework will be assigned and posted on blackboard system approximately every week and will be due in one week. You can access Blackboard (Bb) at:

<http://blackboard.stonybrook.edu>. Use your NetID and password to log in. Your NetID is different from your Stony Brook ID number.

Homework must be submitted by the specified due date. No late homework will be accepted as the solutions get posted immediately afterwards.

9. Course Learning Objectives (CLO)

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

1. Demonstrate the ability to identify the three modes of heat transfer: conduction, convection, and radiation, and solve simple multi-mode heat transfer problem.
2. Demonstrate the ability to formulate and solve the differential equation of heat conduction in various coordinates systems with proper thermal boundary conditions.
3. Demonstrate the ability to develop thermal resistance networks for practical heat conduction problems.
4. Demonstrate the ability to solve transient lumped-parameter heat conduction problems.
5. Demonstrate the ability to analyze convective heat transfer in boundary layer and internal pipe flows based on Newton's law of cooling.
6. Demonstrate the ability to analyze radiative heat transfer between nonblack surfaces.

10. Course Delivery/Modality

The course delivery will be delivered in-person format and content will be delivered through the Blackboard (Bb) learning management system (LMS), Slack and Zoom. All assignments and course interactions will utilize internet technologies. See "Technical Requirements" section for more information.

Here is a quick readiness quiz you can take to determine if you are ready for online courses <http://commons.suny.edu/assessment/quick-readiness-quiz/>

11. Attendance

Students are expected to attend every class, report for examinations and submit major graded



coursework as scheduled. If a student is unable to attend lecture(s), report for any exams or complete major graded coursework as scheduled due to extenuating circumstances, the student must contact the instructor as soon as possible. **Attendance will be randomly tracked!** Students may be requested to provide documentation to support their absence and/or may be referred to the Student Support Team for assistance. Students will be provided reasonable accommodations for missed exams, assignments or projects due to significant illness, tragedy or other personal emergencies. In the instance of missed lectures or recitations, the student is responsible for reviewing posted slides recorded lectures and seeking notes from a classmate. Please note, all students must follow Stony Brook, local, state and Centers for Disease Control and Prevention (CDC) guidelines to reduce the risk of transmission of COVID. For questions or more information, visit: <https://www.stonybrook.edu/commcms/comingback/students.php>

12. Preferred Method of Contact with Instructor

My preferred method of contact is via email at dimitris.assanis@stonybrook.edu. If you would like to talk on the phone, or meet virtually, please email me so that we can set up a mutually agreeable time. I will respond to your emails as soon as possible, but please allow 24 hours or more for a response. Please utilize your Stony Brook University email when getting in touch with me as that is the preferred method of contact from the institution. Include your full name and NetID in all emails to me. To ensure your email is routed in appropriate folder, **the subject line should contain the following phrase: [MEC 305]**. Please make sure post or track the slack channel For questions about HW, course material, etc., please post on Slack channel as others miu.

13. Technologies and Tools

An online class like this cannot be conducted without appropriate use of technologies that enable learning outside a traditional classroom and on your own time. Some of the technologies and tools that would be required in this class are:

1. **Computer and Internet Connection:** This course requires that you have a solid **wired** internet connection to a reliable and working computer with webcam and microphone. Cheap wifi connections do not work and in the past students have had difficulties taking exams when they were connected to unreliable wifi access points, such as at Starbucks, etc. **We will not be responsible for you not being able to connect to the servers during the exam and no extensions on time will be given. Please do not underestimate the importance of having a reliable computer and internet connection. This is the primary reason why students in the past have suffered a great deal.** Please install all the updates on your computer well before an exam. The newer versions of Microsoft Windows OS are not very flexible with scheduling updates. You don't want to initiate an update just before a critical assignment, such as quiz or exam is due.
2. **Blackboard:** The Stony Brook University uses Blackboard (Bb) course management system for all course-related management. The Bb site for this class will be the central online location for posting all class-related materials, announcements, calendar, etc.



3. **Zoom:** The Stony Brook University now recommends the use of Zoom web-conferencing software (<https://stonybrook.zoom.us/>) for online classroom instruction. There is a built-in link available through the course's Blackboard page.
4. **McGraw Hill Connect:** The Connect is an online learning platform from McGraw Hill, which you would use for submitting your HW assignments. See the *Required Course Textbooks* section below on details on how to purchase an access.
5. **Calculators:** Only an approved NCEES allowed calculator will be permissible to use during quizzes and exams. Please see the *Calculator Policy* section below on details.

14. **Communication**

You must have an active Stony Brook University e-mail account and access to the Internet. All instructor correspondence will be sent to your SBU e-mail account or posted on Piazza. Please plan on checking your SBU email account regularly and Piazza forum for course related messages. To log in to Stony Brook Google Mail, go to <http://www.stonybrook.edu/mycloud> and sign in with your NetID and password.

This course uses Bb for the facilitation of communications between faculty and students, submission of assignments, and posting of grades. The Bb Course Site can be accessed at <https://blackboard.stonybrook.edu>

15. **Calculator Policy**

Effective Spring, 2009 only the following calculators are being permitted to be used on all midterm and final exams in the Department of Mechanical Engineering. There will be no exceptions. This list of calculators is identical to that allowed for the National Council for Examiners for Engineering and Surveying (NCEES) Fundamentals of Engineering (FE) exam that many of you will take in your senior year as well as the Professional Engineering (PE) exam that you may take several years from now. The sooner you become comfortable on one of these calculators, the better.

NCEES Allowed calculators as of Nov 2011:

- Casio: All fx-115 models. Any Casio calculator must contain fx-115 in its model name.
- Hewlett Packard: The HP 33s and HP 35s models, but no others.
- Texas Instruments: All TI-30X and TI-36X models. Any Texas Instruments calculator must contain either TI-30X or TI-36X in its model name.

The NCEES policy on calculators can be found here: http://www.ncees.org/Exams/Exam-day_policies/Calculator_policy.php



16. Academic Policies

Academic Integrity Statement: Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty are required to report any suspected instances of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at <http://www.stonybrook.edu/uaa/academicjudiciary/>

Critical Incident Management: Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of Judicial Affairs any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Until/unless the latest COVID guidance is explicitly amended by SBU, during Spring 2022 "disruptive behavior" will include refusal to wear a mask during classes.

University Student Conduct Code can be found at (check for most current version)
<http://studentaffairs.stonybrook.edu/ucs/docs/universitystudentconductcode.pdf>

ADA & Disability Support Services (DSS) Statement: The Rehabilitation Act of 1973 – Section 504 applies to all postsecondary educational programs that receive federal assistance. Reasonable accommodations and academic assistance are provided to students with disabilities registered with the Disability Support Services, ECC (Educational Communications Center) Building, room 128, (631) 632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential. For procedures and information go to the following website: <http://www.stonybrook.edu/ehs/fire/disabilities>

Course Materials and Copyright Statement: Course material accessed from Bb, SB Connect, SB Capture or a Stony Brook Course website is for the exclusive use of students who are currently enrolled in the course. Content from these systems cannot be reused or distributed without written permission of the instructor and/or the copyright holder. Duplication of materials protected by copyright, without permission of the copyright holder is a violation of the Federal copyright law, as well as a violation of Stony Brook's Academic Integrity and [Student Conduct Codes](#).

17. Getting Technical Help **Campus Network or Bb Outage**

When access to Bb is not available for an extended period of time (greater than one entire evening - 6pm till 11pm) you can reasonably expect that the due date for assignments will be changed to the next day.



Getting Help with Bb Learning Management System (LMS)

Students that need help with Bb can contact the TLT Student Help Desk by calling (631) 632-9602, emailing helpme@stonybrook.edu; more information is available via Stony Brook IT: <http://it.stonybrook.edu/services/blackboard#section-6706>

Frequently asked questions about the Bb LMS along with tutorials are available here: <http://it.stonybrook.edu/services/blackboard/navigate-manage>

18. Subject to Change Notice

All material, assignments, and deadlines are subject to change with prior notice. It is your responsibility to stay in touch with your instructor, review the course site regularly, or communicate with other students, to adjust as needed if assignments or due dates change.

19. Syllabus Disclaimer

The instructor views the course syllabus as an educational understanding between the instructor and students. Every effort will be made to avoid changing the course schedule but the possibility exists that unforeseen events will make syllabus changes necessary. The instructor reserves the right to make changes to the syllabus as deemed necessary. Students will be notified in a timely manner of any syllabus changes via email or in the course site Announcements. Please remember to check your SBU email and the course site Announcements often.