

Nuclear Engineering Analysis 1

ENU 4001 Section 1B91

Class Periods: T R, Period 2-3, 8:30 - 10:25 a.m.

Location: MAEB 0238

Academic Term: Fall 2019

Instructor:

Andreas Enqvist

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TBD

Office Hours: T 1:00-2:00, Rhines 100

Teaching Assistants:

N/A

Course Description

Four one-hour lectures discussing continuous and discrete variable solution methods for the statistical, algebraic, differential and integral equations important in nuclear engineering. Problems involving neutron, photon, fluid and temperature distributions in configuration, time and velocity are mathematically modeled, solved and interpreted.

Course Pre-Requisites / Co-Requisites

Pre-req: MAP 2302; Co-req: COP 2271

Course Objectives

1. Graduates will have successful careers in Nuclear Engineering or related disciplines.
2. Graduates will pursue advanced degrees or continuing education.

Materials and Supply Fees

List if applicable

Relation to Program Outcomes (ABET):

Outcome	Coverage*
1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.	High
2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.	
3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	
4. An ability to communicate effectively with a range of audiences	
5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	
6. An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.	

7. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty	
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*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

Required Textbooks and Software

- Title: Foundations in Applied Nuclear Engineering Analysis, 2nd Ed.
- Author: Glenn E. Sjoden
- Publication date: March 30, 2015
- ISBN number: 9814630934 (2nd Ed.), 9812837760 (1st Ed.)

Recommended Materials

Software:

- One of MatLab, Mathematica, Maple, Engineering Equation Solver/TKsolver or equivalent alternative.

Additional reading:

- Advanced Engineering Mathematics, KREYSZIG, 10th Ed., 9780470458365
- Advanced Engineering Mathematics, ZILL, Sept 2016, 6th Ed., 9781449691721
- Schaum's Outline of Differential Equations, BRONSON; COSTA, Mar 2014, 4th Ed. 9780071824859
- Introduction to Nuclear Engineering, 4th Ed, J.R. Lamarsh, 2017, 9780134570051
- Mathematics handbook for science and engineering, RADE, WESTERGREN, 2004, 9783540211419
- Physics handbook, NORDLING; OSTERMAN, 2006, 9789144044538

Course Schedule

Date		Lecture Topic	
August	20	Introduction, prior knowledge test (not graded) Some Basic Terms and Definitions	
	22	Essentials of Probability and Statistics	
	27	Numerical Concepts	
	29	Numerical Concepts	
September	3	Complex Numbers	
	5	Complex Number Systems	
	10	Ordinary Differential Equations	
	12	ODEs and Integrating Factors	
	17	Power Series and Reduction of Order	
	19	Non-Homogeneous Solution Methods	
	24	Midterm Exam #1	
	26	Non-Homogeneous Solution Methods	
	October	1	Power Series
		3	Taylor Series
8		Solving Differential Equations with Variable Coefficients	
10		Solving Differential Equations with Variable Coefficients	
15		Vectors and Matrices	
17		Solving a System Equations and Operations	
22		Solving a System Equations and Operations	
24		Solving a System Equations and Operations ¹	
29		Gram-Schmidt Orthogonalization and Fourier Series	
31		Applied Methods	
November	5	Midterm Exam #2	
	7	Applied Methods and PDEs	
	12	Applications - Heat Transfer	

	14	Applications - Nuclear Heat Transfer
	19	No Class - Travel
	21	Applications - Neutronics (tentative, might have travel)
	26	Applications - Neutronics
	28	No Class - Thanksgiving Holiday
December	3	Class Wrap and Review
	5	Reading day - No class
	11	Final Exam (3:00-5:00 PM Wednesday!)

Attendance Policy, Class Expectations, and Make-Up Policy

Students are expected to attend each class period. Periods which may be missed should be brought to the attention of the Instructor as far in advance of the class period as possible. In the event of an unexcused absence, it is the student's responsibility to obtain and review the material that was covered during that class period. If a student arrives late or leaves early, he/she is expected to do so with minimum level of disruption to the class in progress. If a pop quiz is given before or after the student is in the classroom, he/she will receive zero for that pop quiz (no make-up).

Electronic devices or other distractions are recommended to be avoided, exemption being classes that deal with numerical methods, during which it is welcome to follow or practice using suitable software or laptop or other devices as desired.

Excused absences must be consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework Sets (4)	100 each	20%
Quizzes	100 each	10%
Midterm Exams (2)	100	40%
Final Exam	100	30%
		100%

Homework:

There will be about 4-5 homework sets during the course that will consist of 10-12 problems each. Homework sets will be generally due two weeks after the assignment is issued (by 5 PM). Late homework will receive a penalty of 10% per day late. Electronic submission on the Canvas websystem only.

Mid-Term Exams:

Two cumulative exams will be given during the semester, tentatively scheduled for September 24 and November 5. I will give you a one-week advanced warning for each exam. Each exam will be given during normal class time

Final Exam:

A 2-hour final exam will take place on Tuesday, December 12 from 7:30-9:30 AM. This exam will be open book and will test your knowledge you should have acquired during semester. The final exam will be cumulative.

Grading Policy

Percent	Grade	Grade Points
93 - 100	A	4.00
90 - 92	A-	3.67
87 - 89	B+	3.33
83- 86	B	3.00
80 - 82	B-	2.67

77 - 79	C+	2.33
73 - 76	C	2.00
70 - 72	C-	1.67
67 - 69	D+	1.33
63 - 66	D	1.00
60 - 62	D-	0.67
0 - 59	E	0.00

ENU 4001 is also a critical tracking course. "A C- will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C-average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as

appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.