

Nuclear Engineering Analysis 1

ENU 4001 Class number: 13165

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

Location: Web (Zoom)

Academic Term: Fall 2020

Instructor:

Andreas Enqvist

Enqvist@ufl.edu

352 294 2177

Office Hours: M 1:00-2:00 (Zoom)

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

N/A

Professional Component (ABET):

2 credits Math and Basic Science, 2 credits Engineering Topics.

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	

*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 (other codes that can achieve some or all suitable tasks include: Python, R, Java, C etc).

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
- Schaum's outline of advanced mathematics for engineers and scientists, Murray Spiegel, Oct 2009, 0071635408
- 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
September	1	Introduction, prior knowledge test (not graded) Some Basic Terms and Definitions
	3	Essentials of Probability and Statistics
	8	Numerical Concepts
	10	Numerical Concepts
	15	Complex Numbers
	17	Complex Number Systems
	22	Ordinary Differential Equations
	24	ODEs and Integrating Factors
	29	Power Series and Reduction of Order
October	1	Non-Homogeneous Solution Methods
	6	Midterm Exam #1
	8	Non-Homogeneous Solution Methods
	13	Power Series
	15	Taylor Series
	20	Solving Differential Equations with Variable Coefficients

	22	Solving Differential Equations with Variable Coefficients
	27	Vectors and Matrices
	29	Solving a System Equations and Operations
November	3	Solving a System Equations and Operations
	5	Solving a System Equations and Operations ¹
	10	Gram-Schmidt Orthogonalization and Fourier Series
	12	Applied Methods
	17	Midterm Exam #2
	19	Applied Methods and PDEs
	24	Applications – Heat Transfer
	26	No Class - Thanksgiving
December	1	Applications – Nuclear Heat Transfer
	3	Applications - Neutronics
	8	Class Wrap and Review
	10	Reading day - No class
	3	Class Wrap and Review
	15	Final Exam (7:30 AM - 9:30 AM Tuesday!)

Online Course Recording

Our class sessions **may** be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

F2F Course Policy in Response to COVID-19

We will have face-to-face instructional sessions to accomplish the student learning objectives of this course. In response to COVID-19, the following policies and requirements are in place to maintain your learning environment and to enhance the safety of our in-classroom interactions.

- You are required to wear approved face coverings at all times during class and within buildings. Following and enforcing these policies and requirements are all of our responsibility. Failure to do so will lead to a report to the Office of Student Conduct and Conflict Resolution.
- This course has been assigned a physical classroom with enough capacity to maintain physical distancing (6 feet between individuals) requirements. Please utilize designated seats and maintain appropriate spacing between students. Please do not move desks or stations.
- Sanitizing supplies are available in the classroom if you wish to wipe down your desks prior to sitting down and at the end of the class.
- Follow your instructor's guidance on how to enter and exit the classroom. Practice physical distancing to the extent possible when entering and exiting the classroom.
- If you are experiencing COVID-19 symptoms ([Click here for guidance from the CDC on symptoms of coronavirus](#)), please use the UF Health screening system and follow the instructions on whether you are able to attend class. [Click here for UF Health guidance on what to do if you have been exposed to or are experiencing Covid-19 symptoms](#).
- Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work. [Find more information in the university attendance policies](#).

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 11 from 3:00-5:00 PM. This exam will be closed book and will test your knowledge you should have acquired during semester. The final exam will be cumulative. You will be allowed to bring 2 pages (1 sheet) of handwritten notes to the exam.

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 who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluer.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-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://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-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 Undergraduate Program Coordinator (NE: DuWayne Schubring)
- 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](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf).

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