Rev. 0 – January 2019

ME 291(3 cr. hrs.): Thermodynamics I – Spring 2019

1. **ME 291 (3 cr. hrs.): Thermodynamics I**
2. **Course (catalog) description:** Energy and entropy concepts, applications; first and second law principles, applications to processes and cycles
3. **Pre-requisite(s)/Co-requisite(s):** a grade of C or better in CHM 151, a grade of C or better in (MAT 238 or MAT 239), and (PHY 262 pre-requisite or co-requisite). **Must concurrently enroll in ME291R unless earned a grade of "B" or better in MAT 238 or MAT 239.**
4. **Textbook(s) and/or other required material:**
   Moran, M.J., Shapiro, H.N., *et al., Fundamentals of Engineering Thermodynamics*, 8th edition, John Wiley & Sons, Inc., 2014.
5. **Course objectives:**
   - To gain an understanding of the fundamental principles of thermodynamics and its application to engineering systems. LO (e) *
   - Application of the control volume methodology in solution of engineering problems. LO (a) (e) *
   - Understanding of and ability to use of computer software in solution of thermodynamics problems LO (k) *
   - Exposure to contemporary technical issues associated with energy conversion and utilization. LO (h) *
     *LO's refer to ME Department Learning Outcomes listed below in 8.
6. **Class:** 3 hrs Lecture
7. **Contribution of course to meeting the professional component:** Engineering Science: 100%**:**
8. ***ME Learning Outcomes**
   (a) (1) an ability to apply knowledge of mathematics, science and engineering;
   (b) an ability to design and conduct experiments as well as to analyze and interpret data;
   (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
   (d) an ability to function on multi-disciplinary teams;
   (e) an ability to identify, formulate and solve engineering problems;
   (f) an understanding of professional and ethical responsibility;
   (g) an ability to communicate effectively;
   (h) the broad education necessary to understand the impact of engineering solutions in a global/societal context;
   (i) a recognition of the need for and an ability to engage in life-long learning;
   (j) - a knowledge of contemporary issues;
   (k) - an ability to use the techniques, skills and modern engineering tools necessary for engineering practice.
9. **Attendance in Class, Tests and Final Exam**

Attendance in class is compulsory. In the event of an emergency (medical or otherwise) please inform the instructor via email (Peter.Vadasz@nau.edu) before class or as soon as practically possible after class and schedule an appointment to address the making up of the material lost due to non-attendance. Up to 10%-15% non-submission of homework due to medical or other emmergencies, or for any other reason will not be penalized in the grade allocation. Home-work is due at the beginning of class. No late home-work is accepted for any reason. Missing a test due to an emergency for which there is certified evidence is possibly accommodated via a make-up exam if the student informs timely the instructor via email (Peter.Vadasz@nau.edu) before the test or shortly after the test. Missing the Final Exam due to an emergency for which there is certified evidence qualifies the student for a grade of "Incomplete" ("I") if the student attended class regularly, submitted assignments and completed the tests satisfactorily.

10. **Academic Integrity**

NAU expects every student to firmly adhere to a strong ethical code of academic integrity in all their scholarly pursuits. The primary attributes of academic integrity are honesty, trustworthiness, fairness, and responsibility. As a student, you are expected to submit original work while giving proper credit to other people's ideas or contributions. Acting with academic integrity means completing your assignments independently while truthfully acknowledging all sources of information, or collaboration with others when appropriate. When you submit your work, you are implicitly declaring that the work is your own. Academic integrity is expected not only during formal coursework, but in all your relationships or interactions that are connected to the educational enterprise. All forms of academic deceit such as plagiarism, cheating, collusion, falsification or fabrication of results or records, permitting your work to be submitted by another, or inappropriately recycling your own work

from one class to another, constitute academic misconduct that may result in serious disciplinary consequences. All students and faculty members are responsible for reporting suspected instances of academic misconduct. All students are encouraged to complete NAU's online academic integrity workshop available in the E-Learning Center and should review the full academic integrity policy available at https://policy.nau.edu/policy/policy.aspx?num=100601.

COURSE TIME COMMITMENT

Pursuant to Arizona Board of Regents guidance (Academic Credit Policy 2-224), for every unit of credit, a student should expect, on average, to do a minimum of three hours of work per week, including but not limited to class time, preparation, homework, and studying.

DISRUPTIVE BEHAVIOR

Membership in NAU's academic community entails a special obligation to maintain class environments that are conductive to learning, whether instruction is taking place in the classroom, a laboratory or clinical setting, during course-related fieldwork, or online. Students have the obligation to engage in the educational process in a manner that does not breach the peace, interfere with normal class activities, or violate the rights of others. Instructors have the authority and responsibility to address disruptive behavior that interferes with student learning, which can include the involuntary withdrawal of a student from a course with a grade of "W". For additional information, see NAU's disruptive behavior policy at https://nau.edu/university-policy-library/disruptive-behavior.

NONDISCRIMINATION AND ANTI-HARASSMENT

NAU prohibits discrimination and harassment based on sex, gender, gender identity, race, color, age, national origin, religion, sexual orientation, disability, or veteran status. Due to potentially unethical consequences, certain consensual amorous or sexual relationships between faculty and students are also prohibited. The Equity and Access Office (EAO) responds to complaints regarding discrimination and harassment that fall under NAU's Safe Working and Learning Environment (SWALE) policy. EAO also assists with religious accommodations. For additional information about SWALE or to file a complaint, contact EAO located in Old Main (building 10), Room 113, PO Box 4083, Flagstaff, AZ 86011, or by phone at 928-523-3312 (TTY: 928-523-1006), fax at 928-523-9977, email at equityandaccess@nau.edu, or via the EAO website at https://nau.edu/equity-and-access.

TITLE IX

Title IX is the primary federal law that prohibits discrimination on the basis of sex or gender in educational programs or activities. Sex discrimination for this purpose includes sexual harassment, sexual assault or relationship violence, and stalking (including cyber-stalking). Title IX requires that universities appoint a "Title IX Coordinator" to monitor the institution's compliance with this important civil rights law. NAU's Title IX Coordinator is Pamela Heinonen, Director of the Equity and Access Office located in Old Main (building 10), Room 113, PO Box 4083, Flagstaff, AZ 86011. The Title IX Coordinator is available to meet with any student to discuss any Title IX issue or concern. You may contact the Title IX Coordinator by phone at 928-523-3312 (TTY: 928-523-1006), by fax at 928-523-9977, or by email at pamela.heinonen@nau.edu. In furtherance of its Title IX obligations, NAU will promptly investigate and equitably resolve all reports of sex or gender-based discrimination, harassment, or sexual misconduct and will eliminate any hostile environment as defined by law. Additional important information about Title IX and related student resources, including how to request immediate help or confidential support following an act of sexual violence, is available at http://nau.edu/equity-and-access/title-ix.

ACCESSIBILITY

Professional disability specialists are available at Disability Resources to facilitate a range of academic support services and accommodations for students with disabilities. If you have a documented disability, you can request assistance by contacting Disability Resources at 928-523-8773 (voice), 928-523-6906 (TTY), 928-523-8747 (fax), or dr@nau.edu (e-mail). Once eligibility has been determined, students register with Disability Resources every semester to activate their approved accommodations. Although a student may request an

accommodation at any time, it is best to initiate the application process at least four weeks before a student wishes to receive an accommodation. Students may begin the accommodation process by submitting a self-identification form online at https://nau.edu/disability-resources/student-eligibility-process or by contacting Disability Resources. The Director of Disability Resources, Jamie Axelrod, serves as NAU's Americans with Disabilities Act Coordinator and Section 504 Compliance Officer. He can be reached at jamie.axelrod@nau.edu.

RESPONSIBLE CONDUCT OF RESEARCH

Students who engage in research at NAU must receive appropriate Responsible Conduct of Research (RCR) training. This instruction is designed to help ensure proper awareness and application of well-established professional norms and ethical principles related to the performance of all scientific research activities. More information regarding RCR training is available at https://nau.edu/research/compliance/research-integrity.

SENSITIVE COURSE MATERIALS

University education aims to expand student understanding and awareness. Thus, it necessarily involves engagement with a wide range of information, ideas, and creative representations. In their college studies, students can expect to encounter and to critically appraise materials that may differ from and perhaps challenge familiar understandings, ideas, and beliefs. Students are encouraged to discuss these matters with faculty.

11. NAU Policies

You can find additional important NAU academic policies in a separate document. Please take a few minutes to review and become familiar with them. These policies include:

- Safe Environment Policy
- Students With Disabilities
- Institutional Review Board
- Academic Integrity
- Academic Contact Hour Policy
- Sensitive Course Materials
- Classroom Management Statement

12. Change to drop/add dates

Please note that, the add/drop deadlines for regular 16-week courses in Engineering have been moved up to the fourth day of the semester. You can find additional information about drop/add deadlines at the following link for the Office of the Registrar's enrollment calendar website:
https://in.nau.edu/registrar/spring-2019/

13. Person(s) who prepared this description and date of preparation:

Dr. Peter Vadasz, for Spring 2008.
Edited and reviewed by Dr. Peter Vadasz, January 2008.
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Edited and reviewed by Dr. Peter Vadasz, January 10, 2018.
Edited and reviewed by Dr. Peter Vadasz, January 11, 2019.

TENTATIVE LECTURE SCHEDULE: See separate document.

PLEASE NOTE: Dr. Vadasz does not use BBLearn. Instead he uses the following website for uploading material relevant to this course:
http://www.drvadasz.com/P_Vadasz_Website/ME_291.html