

Saint Louis University, Madrid Campus
Division: Sciences & Engineering

ESCI- 2100 M01: Statics
Fall 2017

Class Days and Time: MW: 9:30-10:45 am

Classroom: PRH 15

Prerequisites: MATH-1510, PHYS-1610

Credit Hours: 3

Instructor name: T.Gasmi, PhD

Instructor's e-mail: Taieb.gasmi@slu.edu

Instructor's Campus Phone: 915545858, Ext. 217

Office hour: MWRF: 12:00-13:00. Please make sure to take advantage of office hours, as they offer a wonderful opportunity for individual interaction.

Course Description: This is a first course in mechanics and is designed to introduce the student to some of the basic physical principles of rigid bodies at rest. Physical phenomena are investigated and solutions to certain problems are developed using well-understood basic principles. One of the major objectives is to develop the student's ability to analyze engineering problems and solve in simple and logical manner. This course is a prerequisite for the follow-up course ESCI- 2150 on Dynamics.

Course Goals:

Upon successful completion of this course, students shall be able to:

- Resolve and add vectors
- Multiply vectors using both dot and cross product
- Find the resultant of any force system in two or three dimensions
- Isolate any body and draw the free-body diagram
- Solve for unknown forces and moments on a body in equilibrium in two or three dimensions
- Determine internal forces in trusses, frames, and machines
- Compute the centroid or the center of mass using integration and composite parts
- Construct shear and bending moment diagrams for beams
- Solve static problems involving friction and belt friction
- Calculate area moments of inertia by integration
- Calculate area moments of inertia using the parallel axis theorem

Learning Outcomes:

- 1 Students gain knowledge of Vector Mechanics, representation of physical quantities by a vector notation. Grasp the meaning of magnitude and direction of a vector; understand the definition of a unit vector.
- 2 Master the mechanics of Vector Algebra.
- 3 Students are able to understand the physical meaning of force and moment equilibrium.
- 4 Master the balance of forces and moments to ensure equilibrium for 2D and 3D structures.
- 5 Students acquire the skill to draw a correct and complete Free Body Diagram of forces and moments for a structure.
- 6 Students learn the method of joints and the method of sections for the analysis of trusses. They also should be able to identify the zero-force members of a truss by inspection.

- 7 Students are able to understand the concept of friction on surfaces and calculate friction forces, and be able to draw the proper FBD showing friction forces.
- 8 Understand the difference between static and dynamic friction.
- 9 Students understand the internal forces in structures, and learn how to draw shear and moment diagrams for beams.
- 10 Students learn how to calculate the Centroid and the Moment of Inertia of lines areas, and composite objects.

Saint Louis University - Madrid Campus is committed to excellent and innovative educational practices. In order to maintain quality academic offerings and to conform to relevant accreditation requirements, the Campus regularly assesses its teaching, services, and programs for evidence of student learning outcomes achievement. For this purpose anonymized representative examples of student work from all courses and programs is kept on file, such as assignments, papers, exams, portfolios, and results from student surveys, focus groups, and reflective exercises. Thus, copies of student work for this course, including written assignments, in-class exercises, and exams may be kept on file for institutional research, assessment and accreditation purposes. If students prefer that Saint Louis University - Madrid Campus does not keep their work on file, they need to communicate their decision in writing to the professor.

Assessment Methods

- Direct assessments throughout the course: Outcomes learnt in course work are assessed via corrected homework, quizzes, exams and projects.
- Indirect assessment: Outcomes learnt are also collected to provide information about student perception of their learning and how this learning is valued by them. Indirect assessment is therefore obtained from the post-first midterm and end-of-term online evaluations.

Required Textbook and Materials:

“Engineering Mechanics: Statics”

R.C Hibbeler

Prentice hall

Attendance and Class Policy:

- (1) Students are encouraged to participate in class discussions and to ask questions.
- (2) Announcements may be made during the semester.
- (3) Useful information for the course may be found on the Blackboard web:
<https://blackboard.slu.edu/>
- (4) Syllabus, reading and homework problems are subject to change.
- (5) Students are responsible for all lecture material, handouts, homework and assigned reading.
- (6) Students are expected to attend all classes unless a reasonable excuse is given.
- (7) Make up exams are not given. Students who legitimately miss an exam, due to a doctor’s visit or family emergency must provide written documentation of the circumstances. A letter from the university counselor is accepted. Exams that are missed illegitimately result in a score of F. Grades for these students will be based on the remaining exams. **Missing more than one exam results in an F grade.**

Course Requirements and Grading Rationale/System:

E-mail: Campus and course announcements will often be handled by e-mail. Students should check their “@slu.edu” e-mail regularly.

Grading system: The grade will be obtained from the following areas:

Homework: **10%**

Mid-term Exam I: **25%**

Mid-term Exam II: **25%**

Final Exam: **40%**

Grading scales from Exams:

A	90-100 %
A-	87-89 %
B+	84-86 %
B	80-83 %
B-	77-79 %
C+	74-76 %
C	70-73 %
C-	66-69 %
D	60-65 %
F	< 60 %

University Statement on Academic Integrity:

Academic integrity is honest, truthful and responsible conduct in all academic endeavors. The mission of Saint Louis University is "the pursuit of truth for the greater glory of God and for the service of humanity." Accordingly, all acts of falsehood demean and compromise the corporate endeavors of teaching, research, health care and community service via which SLU embodies its mission. The University strives to prepare students for lives of personal and professional integrity, and therefore regards all breaches of academic integrity as matters of serious concern.

The governing University-level Academic Integrity Policy can be accessed on the Provost's Office website at: <http://www.slu.edu/madrid/academics>. Additionally, SLU-Madrid has posted its academic integrity policy online: <http://www.slu.edu/madrid/academics>. As a member of the University community, you are expected to know and abide by these policies, which detail definitions of violations, processes for reporting violations, sanctions and appeals. The professor will review these matters during the first weeks of the term. Please direct questions about any facet of academic integrity to your faculty, the chair of the department of your academic program or the Academic Dean of the Madrid Campus.

University Title IX Statement:

Saint Louis University and its faculty are committed to supporting our students and seeking an environment that is free of bias, discrimination, and harassment. If you have encountered any form of sexual misconduct (e.g. sexual assault, sexual harassment, stalking, domestic or dating violence), we encourage you to report this to the University. If you speak with a faculty member about an incident of misconduct, that faculty member must notify SLU's Title IX deputy coordinator, Marta Maruri, whose office is located on the ground floor of Padre Rubio Hall, Avenida del Valle, 28 (mmaruri@slu.edu; 915-54-5858, ext. 213) and share the basic fact of your experience with her. The Title IX deputy coordinator will then be available to assist you in understanding all of your options and in connecting you with all possible resources on and off campus. If you wish to speak with a confidential source, you may contact the counselors at the SLU-Madrid's Counseling Services on the third floor of San Ignacio Hall (counselingcenter-madrid@slu.edu; 915-54-5858, ext. 230) or Sinews Multipletherapy Institute, the off-campus provider of counseling services for SLU-Madrid (www.sinews.es; 917-00-1979). To view SLU-Madrid's sexual misconduct policy and for resources, please visit the following web address: <http://www.slu.edu/Documents/Madrid/campus-life/SLUMadridSexualMisconductPolicy.pdf>.

Students with Special Needs:

In recognition that people learn in a variety of ways and that learning is influenced by multiple factors (e.g., prior experience, study skills, learning disability), resources to support student success are available on campus. Students who think they might benefit from these resources can find out more about:

- Course-level support (e.g., faculty member, departmental resources, etc.) by asking your course instructor.
- University-level support (e.g., tutoring/writing services, Disability Services) by visiting the Academic Dean's Office (San Ignacio Hall) or by going to <http://www.slu.edu/madrid/learning-resources>.

Students with a documented disability who wish to request academic accommodations must contact Disability Services to discuss accommodation requests and eligibility requirements. Once successfully registered, the student also must notify the course instructor that they wish to access accommodations in the course. Please contact Disability Services at disabilityservices-madrid@slu.edu or +915 54 58 58, ext. 230 for an appointment. Confidentiality will be observed in all inquiries. Once approved, information about the student's eligibility for academic accommodations will be shared with course instructors via email from Disability Services. For more information about academic accommodations, see "Student Resources" on the SLU-Madrid webpage.

Note: Students who do not have a documented disability but who think they may have one are encouraged to contact Disability Services.

Fall 2017 Course Schedule:

Monday, September 4	Fall 2017 first day of classes
Sunday, September 17	Last Day to Drop a Class Without a Grade of W and /or Add a Class, choose Audit (AU) or Satisfactory/Unsatisfactory (S/U) Options
Thursday, October 12	Fall Break
Friday, October 13	
Saturday, October 14	
Sunday, October 15	
Thursday, October 19	
Monday, October 30	Last Day to Drop a Class and Receive the Grade of W.
Wednesday, November 1	University Closed
Thursday, November 2	Spring Registration Opens!
Thursday, November 9	University Closed
Wednesday, December 6	University Closed
Friday, December 8	University Closed
Thursday, December 14	Final Exam – Day 1
Friday, December 15	Final Exam – Day 2
Monday, December 18	Final Exam – Day 3 Midyear Commencement!
Tuesday, December 19	Final Exam – Day 4
Wednesday, December 20	Final Exam – Day 5
Saturday, December 23	Grades Due to Registrar

Fall 2017 Final Exam Schedule

	14 Dec (Th)	15 Dec (Fr)	18 Dec (Mn)	19 Dec (Tu)	20 Dec (Wd)
08:30-11:30	Mn classes that meet	Mn classes that meet	Mn classes that meet	Tu classes that meet	Tu classes that meet

	at 9:00 & 9:30	at 10:00	at 11:00 & 11:30	at 9:30 & 10:00	at 8:00
12:00-15:00	Tu classes that meet at 11:00	Mn classes that meet at 13:00	Tu classes that meet at 14:30	Mn classes that meet at 12:00	Tu classes that meet at 12:30
15:30-18:30	Mn classes that meet at 14:30	Tu classes that meet at 17:00 & 17:30	Mn classes that meet at 16:00	Tu classes that meet at 15:30 & 16:00	Mn classes that meet at 17:30
19:00-22:00	---	---	Mn classes that meet at 19:00	Tu classes that meet at 19:00	---

Course Outline:

Week	Topic
1 & 2	- Fundamental concepts and principles of mechanics, elementary vector operation
September 14	Last day to drop a class without a grade of W and/or add a class
3	- Equilibrium of particles: - Free-body diagram, coplanar and three-dimensional force system.
4	- Statics of rigid-bodies: - Equivalent forces - Moment of a force about a point - Moment of a force and equivalent couples - Resolution of a force into a force at a point and a couple - Reduction of systems of forces into a single force and a single couple.
5	- Equilibrium of rigid-bodies: - Reactions at supports and connections for two and three-dimensional structures - Equilibrium in two- and three-dimensions - Statically indeterminate reactions and partial constraints in two-dimensions - Equilibrium of two- and three-force bodies.
6	- Trusses: - Analysis by the method of joints and by the method of sections - Special loading techniques - Space trusses and more complicated models created from several simpler models.
7	- Frames and machines: - Structures containing multi-force members - Analysis of frames - Detachment of certain supports - Machines.
8	- Shear and bending moments in beams and the various relations between load, shear and bending moments.
9	- Dry friction: - Coefficients of friction - Angles of static and kinetic friction - Wedges - Square-threaded screws

	- Belt friction.
10	- Centre of gravity, centre of mass, and centroid: For a system of particles For a body For composite bodies.
11	- Moments of Inertia of areas: Moment of inertia as a second moment Determination by integration Polar moment of inertia Radius of gyration of an area Parallel-axis theorem, Moments of inertia of composite areas.
12	- Mass moment of inertia.
13	- Exam revisions

ABET Accreditation

The Accreditation Board for Engineering and Technology (ABET) is a federation of 31 professional engineering and technical societies. Since 1932, ABET has provided quality assurance of education through accreditation. ABET accredits more than 2500 engineering, engineering technology, computing and applied science programs at over 550 colleges and universities nationally. ABET is recognized by the Council on Higher Education Accreditation.

Educational Objectives

1. Be well rounded engineers for positions of technical responsibility and leadership in a modern multi-disciplinary system-oriented environment that emphasizes problem solving.
2. Achieve high-quality professional performance in both aeronautical and astronautical engineering by integrating a systems view of engineering that is built upon group based design experiences.
3. Demonstrate a solid foundation in aerodynamics, controls, structures, propulsion and their integration into systems design.

Program Outcomes

1. Ability to apply mathematics, physics and statistics to aerospace engineering problems.
2. Ability to identify, formulate and solve aerospace engineering problems in aerothermodynamics, aerodynamics, controls, structures, and propulsion using analytical and numerical methods.
3. Ability to design and conduct lab experiments and flight testing individually and in teams and to perform data analysis and interpretation with modern tools.
4. Ability to conduct multidisciplinary, system-oriented team aircraft and/or spacecraft design.
5. Ability to effectively convey engineering ideas and results both orally and in writing.
6. Awareness of professional and ethical responsibility.
7. Awareness of global, contemporary issues related to aerospace engineering and the society at large.
8. Awareness of rapid advancement of modern technology and ability for life-long learning.