Course Syllabus

1. **Course Title:** Mechanical Test
2. **Course Code:** METE210321
3. **Credit Units:** 1 (0/1/2) (0 units of theory/ 1 unit of practice/ 2 units of self-study)
   Duration: 5 weeks (1 hours of practice, and 2 hours of self-study per week)
4. **Course Instructors**
   1/ MSc. Vương Thị Ngọc Hân
   2/ MSc. Lê Thanh Phong
   3/ Eng. Huỳnh Nguyễn Dũng
5. **Course Requirements**
   Prerequisite courses: None
   Previous courses: Fundamentals of Mechanics (FUME130221), Strength of Materials (STMA240121)
6. **Course Description**
   This course introduces knowledge and basic skills about testing mechanical properties of metal material. The course also provides knowledge about experimental data processing to determine approximate values of mechanical properties of material.
7. **Course Goals**

Goals	Goal Description	Programme ELOs
G1	Review the basis knowledge in mechanics of materials	1.2
G2	Analyze and conduct tests of material properties accurately and safely	2.2, 2.5
G3	Organize teamwork to perform experiment, write report result of experimental data and demonstrate the ability to read documents in English	3.1, 3.2, 3.3

8. **Course Learning Outcomes (CLOs)**

CLOs		CLO Description	Programme ELOs
G1	**G1.1**	Be able to analyze material properties	1.2
G2	**G2.1**	Select and use maturity appropriate models to self-exploited and perform experiments; measure and analyze experimental data to determine properties of metal materials	2.1, 2.2
	G2.2	Recognize population standards in testing of materials. Apply knowledge about properties of metal materials to calculate and process accuracy mechanical parameters of metal materials, models. Guarantee safe in every experiment.	2.2, 2.5
	G2.3	Be able to performance, compare, judge result of testing metal materials.	2.2

G3	**G3.1**	Organize teamwork to perform experiment, write report result of calculating experimental data processing. Develop experience of collaborative group-working.	3.1, 3.2
	G3.2	Be able to read guidelines in English.	3.3

9. Learning Resources

- Textbooks:

1. Lecture notes of Mechanical Experiments – Deparment of Mechanics.
2. R. C. Hibbeler. Engineering Mechanics – Statics. Prentice Hall, 2010.
3. R. C. Hibbeler. Engineering Mechanics – Statics. Prentice Hall, 2010.
4. Mechanics of materials, R. C. Hibbeler, 9th Edition, McFraw-Hill, 2013.

- References:

1. Strengh of Material, Đỗ Kiến Quốc, National University HCMC Publisher, 2004
2. Mechanics of materials, Ferdinand P. Beer, E. Russelll Johnston, JR., McFraw-Hill, 1992.
3. Mechanical Engineering, Đỗ Sanh, Course I+II: Statics and Dynamics, Education Publisher, 2008.
4. J. L. Meriam, L. G. Kraige. Engineering Mechanics, Seventh Edition. John Wiley & Sons, Inc, 2006.
5. Fundamental of Materials, Nghiêm Hùng, Education Publisher, 2006.

10. Student Assessment

- Grading scale: **10**
- Assessment plan:

Type	Content	Timeline	Assessment method	CLOs	Rate (%)
Quickly Test					**50**
First Day	Examine basis knowledge about metal materials and executive level about safe regulations in Lab	Week 1	Oral examination	G1.1	10
Experiment					**40**
Ex #1+2	Determine properties of metal material when tensile ductile sample (steel sample) and compress brittle sample (cast iron sample).	Week 2	Group-working Test and report testing result	G1.1, G2.1, G2.2, G2.3 G3.1, G3.2	10
BT#3	Determine shear of modulus G in torsion bar.	Week 3	Group-working Demonstration	G2.1, G2.2, G2.3 G3.1, G3.2	10
BT#4	Determine Elasticity of modulus E in bending beam.	Week 4	Group-working Demonstration	G2.1, G2.2, G2.3 G3.1,	10

				G3.2	
BT#5	Determine moment of inertia J.	Week 5	Group-working Demonstration	G2.1, G2.2, G2.3 G3.1	10
Report final course					**50**
	After finish this course, the students submit 01 experiment report including 05 tasks. Indicate particularly theoretical basis, method making experiments, result experiment, judge result experiment.	After finish course 01 week	Individual report	G1.1, G2.1, G2.2 G2.3 G3.1, G3.2	**50**
Total					**100**

11. Course Content

Week	Content	CLOs
1	***The opening chapter :* Introduction** *(0,4h,8h)*	
	A/ Content and pedagogical methods in class*: (4h)* **Content:** 1.1. Introduce the course's goals, CLOs, content, pedagogical and assessment methods. 1.2. Provide Lab's regulars, method safe in testing metal materials and industrial hygiene in Lab. 1.3. Introduce methods testing to determine the properties of metal materials. 1.4. Introduce the operating priciples of measuring instruments, models, machines. 1.5. Equipments: • Tensile and compress Hydraulic Testing Machine. • Torsion and bending experiment models. • Bending experiment models • Moment of inertia experiment models. 1.6. Guide the process to get sample and the steps testing. **Pedagogical methods**: + Presentation of lecture + Organize groups.	G1.1, G2.2, G3.2
	B/ Self-study content: *(8 h)* + Review knowledge about stress and strain in Mechanical of Materials Course, introduce to constants represented the properties of metal materials. + Find out the popular standards in testing mechanical properties of metal materials.	G1.1
2	***Chapter 1+2:* Determine properties of metal material when tensile**	

	ductile sample (steel sample) and compress brittle sample (cast iron sample) *(0/4h/8h).*	
	A/ Content and pedagogical methods in class*: (4h)* **Content:** **2.1.** Introduce theoretical basis, objectives, signification of mechanical properties of metal materials. **2.2.** Present method to prepare testing samples **2.3.** Present about operating principles of measuring instruments, Tensile and compress Hydraulic Testing Machine. **2.4.** Guide the process to get sample and the steps testing. **Pedagogical methods**: + Lecture guide the steps experiments and represent safe regulars when testing mechanical properties of materials in the machine. + The students do these contents under observation of lecture. + The group of students calculate and processing experimental data.	G1.1, G2.1, G2.2, G2.3, G3.1. G3.2
	B/ Self-study content: *(8h)* + Structure and classify the main steel group. + The mechanical properties of steel and cast iron, method to determine. + Hooke law.	G1.1
3	***Chapter 3:*** **Determine shear of modulus G in torsion bar.** *(0h,4h,8h)*	
	A/ Content and pedagogical methods in class*: (4h)* **Content:** **3.1.** Introduce theoretical basis, objectives, signification of mechanical properties of metal materials in torsion bar. **3.2.** Present method to prepare these experiments. **3.3.** Present about operating principles of measuring instruments, experimental model. **3.4.** Guide the steps to start experiment. **Pedagogical methods**: + Presentation of lecture and lecture provide data to experiment. + Lecture guide students manipulate to set up the displacement gauges, method to read values in gauges. + Lecturer assesses reading comprehension of students by making questions and discuss about processing experiment. + Group student calculate experimental result upon data received.	G2.1, G2.2, G2.3, G3.1. G3.2
	B/ Self-study content: *(8h)* + Concept of torsion. + Formula to caculate moment torsion and torsion angle. + Hooke law. + Relationship load and displacement in torsion bar.	G1.1
4	***Chapter 4:*** **Determine Elasticity of modulus E in bending beam**. *(0,4h,8h)*	

	A/ Content and pedagogical methods in class*: (4h)* **Content:** **4.1.** Introduce theoretical basis, objectives, signification of mechanical properties of metal materials in bending beam **4.2.** Present method to prepare this experiments. **4.3.** Present about operating principles of measuring instruments, experimental model. **4.4.** Guide the steps to start experiment **Pedagogical methods**: + Presentation of lecture and lecture provide data to experiment. + Lecture guide students manipulate to set up the displacement gauges, method to read values in gauges. + Lecturer assesses reading comprehension of students by making questions and discuss about processing experiment. + Group student calculate experimental result upon data received.	G1.1, G2.1, G2.3, G2.3, G3.1, G3.2
	B/ Self-study content: *(8h)* + Concept of bending beam and pure bending. + Formula to caculate displacement and turning angle in bending beam. + Hooke law. + Relationship between load and displacement in bending beam.	G1.1
5	***Chapter 5:*** **Determine moment of inertia J.** *(0h,4h,8h)*	
	A/ Content and pedagogical methods in class*: (4h)* **Content:** **5.1.** Introduce theoretical basis, objectives, signification of roller when moving plane – parallel. **5.2.** Present method to prepare these experiments. **5.3.** Present about operating principles of measuring instruments, experimental model. **5.4.** Guide the steps to start experiment **Pedagogical methods**: + Presentation of lecture and lecture provide data to experiment. + Lecture guide students method experiment. + Lecturer assesses reading comprehension of students by making questions and discuss about processing experiment. + Group student calculate experimental result upon data received.	G1.1, G2.1, G2.2, G2.3,G3.1
	B/ Self-study content: *(8h)* + Concept of moving plane-parallel. + Determine equations motion of roller when moving on inclined plane. + Formula to calculate inertia moment.	G1.1

12. Learning Ethics

If students copy experimental data each other, they will be subtract 100% total mark of this course.

If plagiarism is found students will get zero point.

If students don't coming Lab fully, they will be failing this course.

13. Date of first approval: August 1st, 2012

14. Approved by

Dean	**Head of Department**	**Instructor**
A/Prof. Dr. Nguyễn Trung Kiên	**Dr. Phạm Tấn Hùng**	**MSc. Vương Thị Ngọc Hân**

15. Date and Up-to-date content

1st time: Date	Instructor: Head of Department: