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| Akashi College | | Year | 2022 | | Course Title | Structural Analysis ⅢA |
| Course Information | | | | | | |
| Course Code | 4415 | | | Course Category | Specialized / Compulsory | |
| Class Format | Lecture | | | Credits | School Credit: 1 | |
| Department | Architecture | | | Student Grade | 4th | |
| Term | First Semester | | | Classes per Week | 2 | |
| Textbook and/or Teaching Materials | 中川肇「基礎から学ぶ」建築構造力学 理論と演習からのアプ ^ロ ーチ ((株)井上書院)を使用する。(参考図書)鈴木基行著:構造力学徹底演習、森北出版 | | | | | |
| Instructor | SHOJO Naoya | | | | | |
| Course Objectives | | | | | | |
| (1) To calculate the deformation and stress of a statically indeterminate structures (Beam, Rigid frame, Truss structure) using the principle of virtual work. (2) To calculate the stress of a statically indeterminate beam using the principle of virtual work. To be able to draw the graph of the stress of a statically indeterminate beam. | | | | | | |
| Rubric | | | | | | |
| | Ideal Level | | Standard Level | | Unacceptable Level | |
| Achievement 1 | Can well explain the principles of virtual work and energy. | | Can explain the principles of virtual work and energy. | | Can not explain the principles of virtual work and energy. | |
| Achievement 2 | Can well use the principles of virtual work and energy to calculate the fulcrum reaction force, stress (graph), deformation (deflection, deflection angle) of a structure (beam, rigid frame, truss, etc.) | | Can use the principles of virtual work and energy to calculate the fulcrum reaction force, stress (graph), deformation (deflection, deflection angle) of a structure (beam, rigid frame, truss, etc.) | | Can not use the principles of virtual work and energy and can not calculate the fulcrum reaction force, stress (graph), deformation (deflection, deflection angle) of a structure (beam, rigid frame, truss, etc.) | |
| Achievement 3 | Can well calculate the fulcrum reaction force of a statically indeterminate structure using principles for statically indeterminate structure, such as the virtual work method. | | Can calculate the fulcrum reaction force of a statically indeterminate structure using principles for statically indeterminate structure, such as the virtual work method. | | Can not calculate the fulcrum reaction force of a statically indeterminate structure using principles for statically indeterminate structure, such as the virtual work method. | |
| Assigned Department Objectives | | | | | | |
| Teaching Method | | | | | | |
| Outline | Structural analysis is the basis for building structure and structural design. The applied course follows Structural Analysis I (2nd year) and Structural Analysis III (3rd year). The students will learn the mechanical differences between statically determinate and statically indeterminate structures. The students will acquire solving methods for statically indeterminate structures, such as the stress method, and displacement method. Also, the students will gain knowledge of the representative solving methods, for statically indeterminate structures (rigid frame structure), such as the slope deflection method and moment distribution method. As part of the school global education, the tests and exercises are in English. | | | | | |
| Style | Lecture and problem-solving practice using textbook chapters 12 to15. | | | | | |
| Notice | To listen to the lectures and take notes. To solve exercise problems and understand them correctly. The students are supposed to ask questions and make sure they know the content before proceeding in the course. The students should review the topics learned in structural analysis courses I (2nd year) and II (3rd year). 5 absences will be excused. | | | | | |
| Characteristics of Class / Division in Learning | | | | | | |
| <input type="checkbox"/> Active Learning | | <input type="checkbox"/> Aided by ICT | | <input type="checkbox"/> Applicable to Remote Class | | <input type="checkbox"/> Instructor Professionally Experienced |
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| Course Plan | | | | | | |
| | | | Theme | Goals | | |
| 1st Semester | 1st Quarter | 1st | Stable or unstable, statically or non-statically structure (1) Discusses the differences between stable or unstable, statically or non-statically structures. | To understand the discriminant of a stable or an unstable and statically or non-statically of the structure through a various example model. | | |
| | | 2nd | Stable or unstable and statically or non-statically structure (2) | To review the content learned at the previews structural analysis courses. | | |
| | | 3rd | Work and strain energy (1) | To understand the external and internal works of a statically determinate beam. | | |
| | | 4th | Work and strain energy (2) | To understand the strain energy due to axial force, bending moment and shear force. | | |
| | | 5th | Work and strain energy (3) Quiz (3) Deformation of a statically determinate beam using the principle of virtual work. | To understand the principles of virtual work and strain energy due to shear force. | | |
| | | 6th | Work and strain energy (4) | To calculate the deflection of a statically determinate beam using the Castiglano's theorem. | | |
| | | 7th | Work and strain energy (5) Assignment (2) | To review the content learned | | |
| | | 8th | Mid-term Exam | | | |
| | 2nd Quarter | 9th | The deflection of statically determinate structure (1) | To understand the deflection of a statically truss using the principle of virtual work. | | |
| | | 10th | The deflection of statically determinate structure (2) | To understand the deflection of statically rigid frame structure using the principle of virtual work. | | |

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| | | 11th | The deflection of statically determinate structure (3) Assignment (2) | To review the content learned |
| | | 12th | Non-statically determinate structure (1) | To understand, through example, the degree of redundancy of non-statically structure, and various kinds of non-statically beams and rigid frame structures. |
| | | 13th | Non-statically determinate structure (2) | To execute a stress analysis of non-statically determinate beam using the principle of virtual work. |
| | | 14th | Non-statically determinate structure (3) | To calculate, using models, the stress of Non-statically continuous beams. |
| | | 15th | Non-statically determinate structure (4) Assignment (4) | To review the content learned |
| | | 16th | End-term Exam | |

Evaluation Method and Weight (%)

| | Examination | Assignments | Total |
|-------------------------|-------------|-------------|-------|
| Subtotal | 80 | 20 | 100 |
| Basic Proficiency | 0 | 0 | 0 |
| Specialized Proficiency | 80 | 20 | 100 |
| Cross Area Proficiency | 0 | 0 | 0 |