# 國立台灣科技大學 114學年 第2學期　課程大綱

## Spring 2026 NTUST Course Outline

授課教師：鄧伊茹

Instructor:I-Ju Teng

課程名稱：材料科學(二)

Course Title：Materials Science (II)

2026/11/3

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| 課程代號： TE2010301<br>Course Code<br>學分數： 3<br>Credits | 必選修：必修/半學年<br>Required/Electve:Required/Half Yr.<br>先修課程：<br>Prerequisites |
| 節次教室：<br>Time/Location | M3(TR-515) M4(TR-515) R8(TR-515) |
| 專業核心能力：<br>Core Professional Competencies | 運用科學及工程知識的能力 |
| 課程網址：<br>Course Website | https://moodle2.ntust.edu.tw/course/view.php?id=17892 |
| 課程宗旨：<br>Course Objectives | This course aims to deepen students' understanding of materials behavior through diffusion, phase transformations, microstructure evolution, and functional properties. It focuses on the scientific principles that govern materials processing and performance, including phase diagrams, transformation kinetics, heat treatment strategies, and structure–property relationships.<br><br>The course emphasizes the analysis of electrical, thermal, magnetic, and optical behaviors based on underlying mechanisms, and highlights how processing conditions influence microstructure and material properties. Students are guided to integrate knowledge across chapters to make informed materials engineering decisions.<br><br>In addition, the course cultivates the ability to evaluate trade-offs among performance, processing, economic, and sustainability considerations in real engineering contexts. Clear technical communication in English and collaborative problem-solving are also emphasized as essential professional skills. |
| 課程大綱：<br>Outline of Lectures | The Planned Course Topics (Tentative):<br>Chapter 5: Diffusion<br>Chapter 9: Phase Diagrams<br>Chapter 10: Phase Transformations: Development of Microstructure and Alteration of Mechanical Properties<br>Chapter 11: Applications and Processing of Metal Alloys<br>Chapter 18: Electrical Properties<br>Chapter 19: Thermal Properties<br>Chapter 20: Magnetic Properties<br>Chapter 21: Optical Properties<br>Chapter 22: Environmental, and Societal Issues in Materials Science and Engineering (if time permits) |
| 授課方式：<br>Method of Instruction | 講授 Lecture：50%<br>分組討論 Group discussion：20%<br>案例研討 Case study：15%<br>操做練習 Practical exercises：15% |

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| | 講授 Lecture：Teaching Strategies/Methods:<br>1. Constructive Alignment (ILOs Activities Assessment)<br>2. Structured & Goal-Oriented Instruction (BOPPPS model)<br>3. Active & Collaborative Learning<br>4. Project- & Case-Based Learning<br>5. Language Support & Multiple Learning Tools% |
| 教科書：<br>Textbooks | Materials Science and Engineering, by William D. Callister, JR. and David G. Rethwisch, 10th Edition, 2020 John Wiley & Sons (Asia) Pte Ltd., ISBN: 9781119453918 (滄海圖書) |
| 參考書目：<br>References | 1.The Science and Engineering of Materials, Enhanced, 7th Ed., Askeland & Wright.。2.Foundations of Materials Science and Engineering, 6th Ed., Smith & Hashemi.。3.PhET Interactive Simulations (University of Colorado Boulder).。4.WileyPLUS (online platform for Callister's textbook).。5.AccessEngineering (Engineering reference database).。6.Open Resources: MIT OCW; Open Yale Courses; etc.。7.Language support (Padlet available): YouGlish/Natural Readers; etc.。8.工程材料科學, by 劉國雄、鄭晃忠、李勝隆、林樹均、葉均蔚 (全華科技圖書)。 |
| 修課須知：<br>Notice | 1.Innovative Teaching Approach: Constructive Alignment, BOPPPS,ICAP, Active & Collaborative Learning, Project- & Case-Based Learning, Language Support & Multiple Tools. 2.There is a TA for this course. 3.The course may include online sessions; do not record without permission. 4.Instructor may record for teaching improvement; student privacy respected. 5.Check Moodle and Line group regularly for updates. 6.Materials are for learning only; do not copy, share, or upload without permission. |
| 評量方式：<br>Grading | (Tentative)<br>1. Major Exam:30%<br>2. Quizzes and Learning Checks: 30%<br>3. Integrative Application Project: 20%<br>4. In-Class Engagement & Collaboration: 20% (attendance, participation, teamwork, student-on-duty, mock qestions, and related activities) |
| 備註說明：<br>Notes | 1.No cheating, plagiarism, or disrespect; treat others with respect; follow university and syllabus rules. 2.Submit assignments on time. Late work may lose points or not be accepted.3.Group Work: Everyone must contribute; teamwork quality affects grade. Avoid free-riding. 4.No make-up for missed/late quizzes or exams (except documented emergencies). Notify instructor in advance if possible. 5.Arrive on time, keep phones silent, avoid distractions, focus on class-related activities. |