Last updated on 6 Jan 2026

**The Hong Kong University of Science and Technology**

***Department of Industrial Engineering***
***and Decisions Analytics***

***[Syllabus in Standardized Format]***

# IEDA 2100S: COMPUTING IN INDUSTRIAL APPLICATIONS

## (Spring Semester 2026 Course Vector: 2-0-3:3)

## Syllabus is evolving (last updated on 6 Jan 2026)

**Prof. Richard H.Y. So**
**Rm5597, Tel: 2358 7105,**
**E-mail: rhyso@ust.hk**

**Lectures:** Tue 13:00 – 12:50, Rm1027 (LSK)

**Labs:** Mon, 10:30 - 13:20 ; 17:00 – 19:50 (Rm 4223)

IEDA 2100S: COMPUTING IN INDUSTRIAL APPLICATIONS

3 credits

**Name:** Prof. Richard So

**Email:** rhyso@ust.hk

**Office Hours:** by email appointment (rhyso@ust.hk)

**Course Description**

### Aims:

To equip IEDA students with the knowledge of micro-processor controls and automations so that you are confident to work in high value-added industries such as IoT systems, medical devices, and high-end consumer products.

### Learning Philosophy:

Successful IEDA graduates are creative in using advanced technology. Creativity is about making new and original associations among different technologies. This course will provide hands-on experience on automation technology. Teaching methods are through lectures, lab sessions, midterm and finals.

**Intended Learning Outcomes (ILOs)**

By the end of this course, students should be able to:

Knowledge/Content Related:

(i) acquire and practice the ability to design, construct, analyze and critique a simple control system with sensor and actuators (ILO1);
(ii) acquire and practice the ability to identify, compare and contrast the basic architecture of different computers (ILO2);

Academic Skills/Competencies:

(iii) acquire and practice the ability to program a Programmable Logic Controller to perform some automated tasks (ILO3);
(iv) practice the ability to solve automation technology problems through self-learning (ILO4).

**Assessment and Grading**

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

## Course Grading:

| | | |
|---|---|---|
| Mid-Term Exam | 20% | (Open-book exam.) |
| Final Exam | 35% | (Open-book exam.) |
| Lab. work | 40% | (**NO copying ***) |
| Class & Lab Participation | 5% | |
| | 100% | * Heavy penalty for copying!! |

**Assessments:**

[List specific assessed tasks, exams, quizzes, their weightage, and due dates; perhaps, add a summary table as below, to precede the details for each assessment.]

| Assessment Task | Contribution to Overall Course grade (%) | Due date |
|---|---|---|
| Mid-Term | 20% | 17/03/2025 * |
| Final Exam | 35% | TBC: see ARR's table time * |
| Lab. work | 40% (No Copying) | Weeks 3 to week 12 * |
| Class Participation | 5% | Week 1 to Week 13 |

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Last updated on 6 Jan 2026

**Course Syllabus (Evolving)**

| | Lecture | Lab session |
|---|---|---|
| Wk1 | Tue (3/2) **Topic 1: Introduction to Automation**<br>- automation in HK<br>- components & structures of automated systems<br>- course overview | Mon (2/2) – no lab |
| Wk2 | Tue (10/2) **Topic 2: Pneumatic Control**<br>- usage in HK<br>- basic components<br>- symbols & circuit diagram | Mon (9/2) – No Lab |
| Wk3 | Tue (17/2) - No lecture (CNY break) | Mon (16/2) – No Lab (CNY eva) |
| Wk4 | Tue (24/2) … continue Topic 2<br><br>**Topic 3: Sensors, transducers, & transceivers**<br>- definitions & usage in HK<br>- types & characteristics<br>- working principles | Mon (23/2) – Lab #1 (Rm4223) |
| Wk5 | Tue (3/3) **Topic 4: Ladder Logic & PLC**<br>- basic PLC hardware<br>- ladder logic diagram for circuit design<br>- ladder logic as a programming tool<br>- case studies & exercises | Mon (2/3) - Lab #2 (Rm4223) |
| Wk6 | Tue (10/3) … continue Topic 4 | Mon (9/3) – Lab #3 (Rm4223) |
| Wk7 | Tue (17/3) …Continue Topic 4 + Tutorial<br><br>** <<Mid-term Examination in the evening>><br>7pm venue TBC ** | Mon (16/3) – Lab #4 |

| | Lecture | Lab session |
|---|---|---|
| Wk8 | Tue (24/3) – No lecture (Prof. So is gaving a Talk in Netherland) | Mon (23/3) - Lab#5 continued (Rm4223) |
| Wk9a | Confirm Tue 1 April AM visit to HACTL<br>10am Tung Chung MTR Exit B (voluntary but need to sign up) | Mon (30/3) – Lab #6 (Rm4223) |
| Wk9a | Tue (31/3) - **Topic 5: Analogue, Digital & Micro-processor Controls**<br>- basics of digital signals<br>- architecture of a PC<br>- standard I/O interfaces of a PC | |
| Wk9b | Tue (7/4) - No Lecture (midterm break) | Mon (6/4) - no lab<br>Mid-term break |
| | Possible 8 April AM visit to HACTL (TBC)<br>10am Tung Chung MTR Exit B (voluntary but need to sign up) | |
| Wk10 | Tue (14/4) – Continue Topic 5 | Mon (13/4) - Lab #7 (Rm4223) |
| Wk11 | Tue (21/4) - **Topic 6: Electro-magnetic Actuation**<br>- usage in HK<br>- types of motors & relays<br>- stepping motors & servo motors | Mon (20/4) – Lab #8 (Rm4223) |
| Wk12 | Tue (28/4) - Continue Topic 6 | Mon (27/4) – no lab |
| Wk13 | Tue (5/5) - Tutorial | Mon (4/5) – no lab |
| | *Study break followed by Final Examination* | |

NB: Lecture notes and lab instructions can be downloaded from CANVAS

**Mapping of Course ILOs to Assessment Tasks**

| Assessed Task | Mapped ILOs | Explanation |
|---|---|---|
| [Lab1 & Lab2] | [ILO1] | [This lab assesses students' ability to design, construct, analyze and critique a simple control system with sensor and actuators (ILO1). ] |
| [Lab3 to Lab7] | [ILO2, ILO3, ILO4] | [These labs assess students' ability to (i) identify, compare and contrast the basic architecture of different computers (ILO2); (ii) program a Programmable Logic Controller to perform some automated tasks (ILO3); (iii) solve automation technology problems through self-learning (ILO4). ] |
| [Lab8] | [ILO2, ILO4] | [These labs assess students' ability to (i) identify, compare and contrast the basic architecture of different computers (ILO2); (ii) solve automation technology problems through self-learning (ILO4). ] |
| [Mid-term] | [ILO1, ILO2, ILO3] | [This examination assesses students' ability to (i) design, construct, analyze and critique a simple control system with sensor and actuators (ILO1); (ii) identify, compare and contrast the basic architecture of different computers (ILO2); (iii) program a Programmable Logic Controller to perform some automated tasks (ILO3). |
| [Final] | [ILO1, ILO2, ILO3] | [This examination assesses students' ability to (i) design, construct, analyze and critique a simple control system with sensor and actuators (ILO1); (ii) identify, compare and contrast the basic architecture of different computers (ILO2); (iii) program a Programmable Logic Controller to perform some automated tasks (ILO3). |
| Participations | [ILO4] | [Asking questions assess students' ability to solve automation technology problems through self-learning (ILO4).] |

**Grading Rubrics**

[Detailed rubrics for each assignment will be provided. These rubrics clearly outline the criteria used for evaluation. Students can refer to these rubrics to understand how their work will be assessed.]

| Assessed Task | Grading Rubrics |
|---|---|
| [Lab1 to Lab8] | • Conscientiousness in team work as demonstrated by not showing up late for lab.<br>• Ability to apply knowledge to practice as demonstrated by carrying out the exercising questions in the lab.<br>• Ability to creatively apply course knowledge as demonstrated by the designing work required by the lab.<br>• Skill level in applying course knowledge as demonstrated by the completion time of lab work. |
| [Mid-term] | • Ability to apply knowledge as demonstrated by correctly solving the easier questions in the examination paper.<br>• Ability to creatively apply and extend course knowledge as demonstrated by solving the design questions in the examination paper.<br>• Skill level in applying course knowledge as demonstrated by the completing the examination questions within the limited time period. |
| [Final] | • Ability to apply knowledge as demonstrated by correctly solving the easier questions in the examination paper.<br>• Ability to creatively apply and extend course knowledge as demonstrated by solving the design questions in the examination paper.<br>• Skill level in applying course knowledge as demonstrated by the completion of the examination questions within the limited time period. |
| Participations | Asking any form of questions related to the course in class or via email or in CANVAS to the instructor. |

**Final Grade Descriptors:**

[As appropriate to the course and aligned with university standards]

| Grades | Short Description | Elaboration on subject grading description |
|---|---|---|
| A | Excellent Performance | [Demonstrates an excellent and comprehensive grasp of course matter; expertise in solving course-related circuit problems. Exhibits a high capacity for scholarship and team collaboration in lab work, going beyond core requirements to achieve learning goals.] |
| B | Good Performance | [Shows good knowledge and understanding of the main course matter, competence in solving course-related circuit problems. Displays high motivation to learn and the ability to work effectively lab team mate.] |

| | | |
|---|---|---|
| C | Satisfactory Performance | [Possesses adequate knowledge of core subject matter, competence in dealing with familiar problems, and some capacity for analysis course-related circuit problems. Shows persistence and effort to achieve broadly defined learning goals.] |
| D | Marginal Pass | [Has threshold knowledge of core subject matter, potential to deal with basic course-related circuit problems. Benefits from the course and has the potential to develop in the discipline.] |
| F | Fail | [Demonstrates insufficient understanding of the subject matter and lacks the necessary problem-solving skills. Exhibits minimal effort towards achieving learning goals. Does not meet the threshold requirements for professional practice or development in the discipline.] |

**Course AI Policy**

For the lab work and general learning, students are free to use generative AI tools to enhance their learning experience without crossing the line of intended copying. For examinations, use of computing devices are prohibited.

**Communication and Feedback**

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include the mistakes made and the corresponding reductions of marks. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

**Resubmission Policy**

Students who are absent for a lab can apply to the TAs for a make-up lab within 2 weeks. A -20% mark discount will be applied unless a valid medical certificate is provided.

**Required Texts and Materials**

**Reference Text:**
This is a lab-based course and full lecture notes and laboratory instructions have been written and will be put on the course Web site.

**Supplementary Reading:**

Jacob, J.M. (1988) Industrial control electronics: application and design. Prentice Hall. ISBN 0-13-459306-5. (TK7881.2 J33 1988).

Phipps, C.A. (1995) Fundamentals of Electrical Control. The Fairmont Press Inc. ISBN 0-13-504846-X. (TK 7881.2 P55 1995).

Smith, E. and Vivian, B.E. (1995) An introductory guide to valve selection. Mechanical Engineering Publications Limited, London. ISBN 0-85298-914-8. (TJ 223 V3 S65 1995).

**Academic Integrity**

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST's Academic Honor Code and to maintain the highest standards of academic integrity. The

University has zero tolerance of academic misconduct. Please refer to Academic Integrity | HKUST – Academic Registry for the University's definition of plagiarism and ways to avoid cheating and plagiarism.