

## Module Outline: Comp2304 Robotics 2023-24, Semester 1

This Module Outline provides details of your module and your learning objectives that you need to know to achieve a successful module outcome.

### 1. Who will be teaching me on my module?

Name	Email address	Room No	Staff Profile
<b>Module Leader:</b>	c.price@worc.ac.uk	CH2011	<a href="https://www.worcester.ac.uk/about/profiles/dr-colin-b-price">https://www.worcester.ac.uk/about/profiles/dr-colin-b-price</a> <a href="https://colin-price.wbs.uni.worc.ac.uk/index.htm">https://colin-price.wbs.uni.worc.ac.uk/index.htm</a>

To obtain help with your learning within this module please contact your Tutor or Module Leader by [email c.price@worc.ac.uk](mailto:c.price@worc.ac.uk)

### 2. What are the main themes of my module?

The subject-specific (Robotics) themes include (i) differential-drive robots, (ii) legged robots, (iii) procedural and neural programming, (iv) robot vision.

In addition to these subject-specific themes there are some more general ones:

1) **Collaboration.** You will work in informal groups, and you will be allowed to share data, photos, movies, screenshots and code.

2) **Learning by talking and listening.** You will be actively encouraged to talk with your classmates and with your tutor to discuss ideas, solve problems, debug code, and plan your assignments. The theory behind how conversations help you learn has been developed by the Faculty of Education at Cambridge University. We are fortunate to be collaborating with these folk, to better understand their theory, it's called 'Dialogic Learning'.

3) **Choice.** A range of activities will be provided, you will not be expected to complete all worksheets, instead you will have choice of activities to align with your interests and understanding. There will be a choice of working with **physical** robots and/or **simulated** robots (using the Webots platform or the Unreal Engine).

4) **Research.** Some activities will align with the Tutor's research interests, such as neural circuits, simulations and nonlinear mathematics.

5) **Sustainable Development Goals (UNESCO SDGs).** We will strive to hit SDG-4 and, to some extent explore SDG-7 and SDG-13 if appropriate.



### 3. What is my module week-by-week contents and what do I have to prepare for each session?

The resource list for this module, materials for your preparation, and any pre-sessional work to enable you to participate in class are available on the University Virtual Learning Environment (VLE) Blackboard, which can be accessed via your [MyDay](#) page.

W/C Date	Wk No	Sessions	How does this link to my Assessment?
		The topics below will be spread over the 12 weeks of this module. Time is flexible, so some topics will take more than one session, and you may encounter more than one topic in each session. The order of the topics will stay more-or-less as indicated. Choice is built in, so you are not expected to complete all topics in the list below.	
18-Sep-23	<b>Induction Week</b>		
25-Sep-23	1	Odometry with the Parallax Robot.	Links between topics and assessment will be provided on the appropriate worksheets
02-Oct-23	2	Odometry with the Webots simulator.	
09-Oct-23	3	Braitenberg Vehicles with the Parallax Robot.	
16-Oct-23	4	Braitenberg Vehicles with the Webots simulator.	
23-Oct-23	5	Line following with the Pixy2 camera and Harry the stepper motor robot. Maze solving with the Webots simulator.	
30-Oct-23	<b>Progress Week</b>		
06-Nov-23	6	Object localization and navigation using the Pixy2 camera and Parallax robot.	
13-Nov-23	7	Object localization and navigation using the Webots Simulator.	
20-Nov-23	8	Arduino Hexapod	
27-Nov-23	9	Unreal Engine Hexapod ('GoverPod')	
04-Dec-23	10	Arduino Myriapod	
11-Dec-23	11	Unreal Engine Myriapod	
18-Dec-23	12	Optional investigations with Webots or Unreal Engine Optional Design-Build-Test mini-project.	
25-Dec-23	<b>Christmas Break</b>		
15-Jan-24	<b>Assessment Week</b> <i>Viva voce Examination</i>		

**Bank Holiday Mondays – 6<sup>th</sup> May & 27<sup>th</sup> May**

**Reassessment Week: w/c 8th July**

#### 4. How is this module taught?

This module is 100% hands-on with short tutor presentations. You will learn by experimenting and investigating with Arduino-based robots, Webots simulations and the Unreal Engine.

#### 5. What will I be able to do when I have attended and actively participated in all sessions of my module?

Attendance is essential to your successful module outcome, your degree classification and the development of your employment skills. Active participation in all sessions, whether online or face-to-face, will help you to develop your Graduate Attributes and achieve the module's learning outcomes:

##### a) Learning Outcomes of this module are:

1. Implement and evaluate robot control architectures
2. Apply the theory of robot kinematics.
3. Evaluate a range of sensor and motor-drive systems.
4. Design, build and test a robot application to solve a given problem.

##### b) Your contribution to your Graduate Attributes (which contribute to your employability skills) is:

**Social responsibility:** This will be developed through teamwork and learning conversations.

**Reflective and resilient lifelong learning:** You will take choices, plan investigations and decide how to collaborate in your teams.

**Problem solving:** Most activities will be centred on getting robots to perform some important task or show a particular behaviour.

**Teamwork and effective communication:** Learning conversations will be encouraged at all times through informal collaborations. The design-build-test activity will develop teamwork skills (this is not assessed)

**Digital citizenship:** It's the nature of your course.

#### 6. How does my module engage with the real-world environment?

You will be able to glean support from online communities, especially Arduino and Webots.

#### 7. What have previous students said about my module?

Students are happy with 1) Being free to be creative, 2) Ability to ask new questions and to try new things, 3) Standard of teaching and clear worksheets.

#### 8. Are there any special instructions for this module I need to be aware of?

If you decide to purchase an Arduino kit, make sure you have one based on the Mega2560. This is slightly more expensive than the Uno kits but uses the same Arduino we shall be using in class and has significant grunt.

#### 9. What are my assignments for this module?

Detailed information on the assignments for this module and instructions on how to complete them are provided in your Assignment Briefs which are available on your module's Blackboard site.