

## **TECHNOLOGY-12/13**

### **SELECTIVE UNIT 11 (S11)**

(Robotic Science)  
(July 2017)

**Unit Statement:** The student will demonstrate an understanding of robotic science and gain skills in robot/robot application design. The unit requires the purchase of physical robots such as Lego Mindstorms or VEX. The student will develop, test, and revise a well thought out plan. The student may work collaboratively during development, experimentation, and evaluation of a major project, and will solve complex problems that arise. Results are shared, and the student is encouraged to participate in a robotics competition. The student will research the history and future of robotics, and the social implications of the field. Activities should be linked to real world social and/or economic needs.

**NOTE: this unit should be planned well ahead of time since materials may need to be ordered from overseas. See Suggested Materials for more info.**

**Essential Outcomes:** (must be assessed for mastery)

1. The Student Will define the terms ‘robot’ and ‘robotics’ and explore and document the history/future of robotics (Skynet).
2. TSW describe and explain application of robotics in industry and society and explore the topic of human-computer interaction.
3. TSW develop a plan based on an objective. The plan will include a methodology for testing and achieving the goal.
4. TSW work in small groups collaboratively to execute, test, and re-iteratively evaluate, revise, and re-test their plan.
5. TSW demonstrate critical thinking in solving problems that arise during experimentation.
6. TSW summarize and report the results of their robotics project to the class.
7. TSW research and present information on the implications of artificial intelligence on society.

**Suggested Materials:**

[Mindstorms Lego Robotics](#) – Very popular with elementary all the way up to secondary. It is very easy to use and students can be up and running in one class period.

[VEX Robotics](#) – Aimed at middle school up to secondary.

[RobotC](#) – for more advanced students, this is a programming language used to program Mindstorms and VEX.

Any robotic kit/software can be used.

### **Suggested Websites:**

- TSW 1-2: Short video on robots – requires Brainpop membership  
<https://www.brainpop.com/technology/computerscience/robots/>
- TSW 3-6: Step by step guides for students to follow for Lego Mindstorms and VEX.  
<http://www.legoengineering.com/get-started/>  
<http://www.education.rec.ri.cmu.edu/content/lego/ev3/>  
<http://curriculum.vexrobotics.com/unit-overview>
- TSW 7: Two videos on artificial intelligence.  
<http://ed.ted.com/lessons/the-turing-test-can-a-computer-pass-for-a-human-alex-gendler>  
<http://ed.ted.com/lessons/can-robots-be-creative-gil-weinberg>

### **Support & Enthusiast sites**

<http://www.kipr.org/>

### **Competition and event information**

<http://robotevents.com/> -VEX Robotic Competitions

<http://www.firstlegoleague.org/> -LEGO Competitions in China, Italy, Moldova, Montenegro, Slovakia, Slovenia, Thailand, Ukraine, Yemen, and other parts of the world

<http://www.firstinspires.org/> - Competitions in China and other parts of the world

Destiny Webpath Express (found on QSI schools Library site) use this search engine to find age-appropriate websites that align with this unit.

### **Suggested Activities**

TSW 1-2, 6-7: Students will use the skills that they gained in E04 and E05 to give a collaborative presentation of all their findings.

TSW 3-5: Students will follow the curriculum from one of the websites suggested above to completion.

Students will build a robot with the aim of competing in a robotic competition, whether in school or outside of school.

Note: The robot design can be as complex as having a preprogrammed robot to complete a task or as simple as a battle bot.

*ASSESSMENT RUBRIC FOUND ON FOLLOWING PAGE.....*

## Assessment Rubric – S11 – Robotic Science

**Student Name:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**To receive a ‘B’ the student must show ‘B’ level mastery on ALL Essential Outcomes. (TSW’s)**

**To receive an ‘A’, the student must show ‘A’ level mastery on 5 available and ‘B’ level mastery on all remaining TSW’s.**

<b>TSW</b>	<b>‘A’ Level Mastery</b>	<b>‘B’ Level Mastery</b>	<b>‘P’ Comments</b>
<b>1. The Student Will</b> define the terms ‘robot’ and ‘robotics’ and explore and document the history/future of robotics.	Definitions are clear and precise, with examples to help clarify. Explores both the history and future of robotics.	Defines the term ‘robot’ and ‘robotics’ in own words. Explores history or future of robotics.	
<b>2. TSW</b> describe and explain application of robotics in industry and society and explore the topic of human-computer interaction.	Explanation is clear and gives many examples that show understanding.	Demonstrates an understanding by giving basic examples.	
<b>3. TSW</b> develop a plan based on an objective. The plan will include a methodology for testing and achieving the goal.	Develop a complete plan. Can explain why result is as expected or not and can re-test with new modifications to obtain desired result.	Develop a complete plan and testing methodology to record results.	
<b>4. TSW</b> work in small groups collaboratively to execute, test, and re-iteratively evaluate, revise, and re-test their plan.	Is a successful member of a team during the design, development, and experimentation stages. Participates fully in the decision-making process. Resolves conflicts and has own opinion and stands up for it. Always works in a constructive manner.	Is a successful part of a team during the design, development, and experimentation stages. Participates in the decision-making process.	
<b>5. TSW</b> demonstrate critical thinking in solving problems that arise during experimentation.	Actively solves problems that arise during the research, design, development and experimentation stages while building a hands-on model. Not only solves problems but also listens to suggestions made by others.	Helps to solve problems that arise during the research, design, development and experimentation stages while building a hands-on model. Will listen to others most of the time.	
<b>6. TSW</b> summarize and report the results of their robotics project to the class.	Reports the overall outcome of the project. Whether it was a success or a failure and provides at least three solid applicable ways that they could improve their project in the future.	Reports the overall outcome of the project. Whether it was a success or a failure and provides one solid applicable way that they could improve their project in the future.	
<b>7. TSW</b> research and present information on the implications of artificial intelligence on society.	Presents a robust view of the effects of artificial intelligence on society. Discusses pros and cons of it and current and future uses of AI.	Narrowly discusses of the effects of artificial intelligence on society. Discusses pros or cons of it and current or future uses of AI.	