

**SPORT SCIENCE & MANAGEMENT**  
**SS2328 SPORT TECHNOLOGY AND INNOVATION**

<b>Academic Year</b>	2025-26	<b>Semester</b>	2
<b>Course Coordinator</b>			
<b>Course Code</b>	SS2328		
<b>Course Title</b>	Sport Technology and Innovation		
<b>Pre-requisites</b>	-		
<b>No of AUs</b>	3		
<b>Contact Hours</b>	39		

**Course Aims**

This course introduces fundamental topics related to sport technology and innovation to equip you with the knowledge and competence to thrive in the increasingly technology-rich environment in sport, physical education and physical activity settings. In addition, content related to sport engineering, programming, and web technologies are covered. Through this course, you will develop a capacity to appreciate sport-related technology, independent learning and innovation.

**Intended Learning Outcomes (ILO)**

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

1. describe the current developments pertaining to the use of technology in sports, exercise and physical education.
2. formulate in-depth discussions of topics and issues related to sport technology and innovation.
3. perform basic programming tasks for devising a cloud-based tool for use in sports, exercise or physical education settings.

**Course Content**

The following topics will be covered:

1. Existing technological innovations in relation to sports, exercise and physical education
2. Fundamentals of sport engineering
3. Instrumentation technology
4. New product design process and basic human factor considerations
5. Basics of architecture for a cloud-based tool or web applications
6. MIT App Inventor programming
7. Python programming
8. Programming of cloud-based applications

## NTU Competencies & Graduate Attributes

### NTU Competencies

Character	√
Competence	√
Cognitive agility	√

### NTU Graduate Attributes

Graduate Attributes	Level (i.e., basic, intermediate, advanced)
1. Problem Solving	Intermediate
2. Sense Making	Intermediate
3. Critical Thinking	Advanced

## Assessment (includes both continuous and summative assessment)

Component	ILO Tested	Weighting	Team/ Individual	Assessment Rubrics
1. Group Project	1,2	30%	Team – 18%; Individual – 12%	Appendix 1
2. Programming Test	2,3	30%	Individual	
3. Web-based Learning, Portfolio Curation and Presentation	1,2,3	40%	Individual	Appendix 2
Total		100%		

## Formative Feedback

Feedback for learning will be verbally provided during each laboratory class session, where you have the opportunity to learn techniques and apply yourselves to problems related to sport technology. You will receive verbal feedback on the techniques and mistakes in the experimental work, alongside suggestions for improvement.

Upon completing the Group Presentation, you will receive verbal and/or written feedback about your assessed performance. For the assignment, feedback will be provided verbally or written. Generic written feedback will be provided to the class for the tests.

## Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Coding Test	Coding tasks will be assigned as tests in class for you to utilise what you recently learned to solve specific problems. This targets LO3.
Tutorial Sessions	Tutorial sessions have been designed to incorporate multiple types of learning: <ul style="list-style-type: none"><li>- Short lectures to support understanding of key concepts.</li></ul>

	<ul style="list-style-type: none"> <li>- Hands-on group learning setting for mastering assigned programming languages and trying out technologies.</li> <li>- Small group activities like discussions allow space and time for you to assimilate the content and for sharing.</li> <li>- Time will be given for learning from online materials as a part of flip teaching.</li> </ul> <p>This targets LO1, LO2 and LO3.</p>
Group Project	<p>This is an opportunity for you to work collaboratively in small groups to discuss the opportunities for applications of new technologies in sports and to propose possible solutions.</p> <p>This targets LO2.</p>
Online Learning, Portfolio Curation and Presentation	<p>This is an opportunity to gather online artefacts related to the course contents and consolidate your learning.</p> <p>This targets LO1, LO2, and LO3.</p>

## Reading and References

### NIE Research and Publications

1. Chuang, K. L., Kee, Y. H., & Chen, H. H. (2022). Implementation of the gradual release of responsibility informed curriculum and pedagogy for teaching programming: Action research based on a course for sport science students. *Journal of Hospitality, Leisure, Sport & Tourism Education*, 30, 100367.
2. Teng PSP, Leong KF, Kong PW, Er BH, Chew ZY, Tan PS, Tee, CH. A methodology to design and fabricate a smart brace using low-cost additive manufacturing. *Virtual and Physical Prototyping* 2022, 17(4), 932-947.

### Other Readings and References

Given the multi- and inter-disciplinary nature of the course, instead of specifying textbooks, it is more appropriate to provide you with a resource package that can be updated with relevant readings and references. Below is a list of potential readings and references that count as a starting point for the resource package, and the list will be updated as and when appropriate.

3. S.L., Schmidt. (2021). *21st Century Sports: How technologies will change sports in the digital age*. Paperback.
4. Fuss, F. A., Subic, M., Strangwood, R., Mehta. (Eds.). (2014). *Routledge handbook of sports technology and engineering*. Routledge.
5. Allen, T., & Goff, J. E. (2017). Resources for sports engineering education. *Sports Engineering*, 1-9. <https://link.springer.com/article/10.1007/s12283-017-0250-1>

## **Course Policies and Student Responsibilities**

### **(1) General**

You are expected to complete all assigned pre-class readings and activities, attend all classes – lecture and laboratory – punctually, submit all scheduled assignments and take tests by due dates. You are not allowed to swap laboratory groups without express permission from the course coordinator. You are expected to take responsibility to follow up with course notes, assignments and course related announcements for sessions they have missed. You are expected to participate in all discussions and class activities unless there is a valid medical reason not to do so.

### **(2) Absenteeism**

Absence from class without a valid reason will affect your overall course grade. Valid reasons include falling sick, supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies.

If you miss a lecture, you must inform the course instructor via email prior to the start of the class.

### **(3) Absence Due to Medical or Other Reasons**

If you are sick and not able to complete a test or submit an assignment, you have to submit the original Medical Certificate (or another relevant document) to the Sport Science & Management (or Home School) administration to obtain official leave. Without this, the missed assessment component will not be counted towards the final grade. There are no make-ups allowed.

## **Academic Integrity**

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognise your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion, and cheating. If you are uncertain of the definitions of any of these terms, you should go to the [NTU Student Academic Integrity Policy and Procedures link](#) in the Student Portal for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Special note: Generative AI tools will be allowed to the extent stipulated for each assignment in the assignment instructions, and any such use must be duly referenced or disclosed.

**Course Instructors**

Instructor	Office Location	Phone	Email
TBA			

**Planned Weekly Schedule**

Week	Topic	ILO	Readings/ Activities
1 - 2	Introduction and overview of existing technological products and inventions in sports, exercise and physical education, monitoring technologies and fan engagement.	1, 2	Short lectures, internet searches, group discussion and sharing.
3 - 6	Fundamentals of sport engineering Instrumentation technology Fundamental product design process Sport product testing Human factor design considerations	1, 2	Hands-on session
7	Group Presentation	1, 2	Presentation
Recess Week			
8	Overview of architecture for a cloud-based solution online web app	3	Short lectures, group experiential learning and peer sharing
9-10	MIT App Inventor	3	
10-13	Python Programming	3	

**Appendix 1: Assessment Criteria for Group Project (30% Final Grade – marked out of 100)**

	A+, A, A-	B+, B	B-, C+, C	D+, D	F
<b>Team Assessment (60 marks)</b>					
<b>Quality of presentation (max 20)</b>	Information provided clearly answers the question set out. Presentation is clear and the flow is coherent and logical. Pace is appropriate.	Information mostly answers the question set. Presentation is mostly clear and the flow generally coherent and logical.	There are weaknesses or absences in the information provided, and the flow of presentation is unclear at times.	Much of the information provided does not answer the question, and the flow is difficult to understand.	Little relevant information and unclear flow.
<b>Demonstration of material (max 30)</b>	Able to clearly demonstrate and thoroughly explain the information required. Able to answer questions in a poised and articulate manner with a high level of confidence.	Good demonstration and explanation of the information required. Able to answer most of the questions clearly and with confidence.	Clear but basic demonstration and explanation of the information required. Able to answer some of the questions clearly but lacks confidence at times.	Poor demonstration and weak explanation of the information required. Has difficulty answering questions and lacks confidence.	Unable to demonstrate or explain the information required. Unable to answer questions.
<b>Use of technology (max 10)</b>	Uses relevant technology very well to supplement and enhance the quality of presentation.	Good use of technology to improve the presentation.	Some use of technology to help improve the presentation.	Little use of relevant technology in the presentation.	No clear use of technology in the presentation.
<b>Individual Assessment (20 marks)</b>					
<b>Communication (max 20)</b>	Presentation is well-	Presentation is well-	Presentation is rushed or	Presentation is unclear	Did not present

	paced, very clear and easy to understand.	paced, clear and easy to understand most of the time.	dull and unclear at times.	and difficult to understand.	
<b>Peer Assessment (20 marks)</b>					
<b>Teamwork* (max 20)</b>	Active contribution to the team	Good and consistent contribution to the team.	Fair contribution to the team.	Poor contribution to the team.	No contribution to the team.
*All individuals within the group are expected to contribute to work involved in the planning, data collection and output. An individual's score may vary from that of the team based on feedback and observations in this area.					

**Appendix 2: Assessment Criteria for web-based learning portfolio curation and presentation (40% Final Grade – marked out of 100)**

	A+, A, A-	B+, B	B-, C+, C	D+, D	F
<b>Quantity and consistency in artefacts update (max 20)</b>	80-100% consistency in updating artefacts throughout the semester based on 3 unique entries per week.	70% to 79% consistency of updates of artefacts throughout the semester based on 3 unique entries per week.	60% to 69% consistency of updates of artefacts throughout the semester based on 3 unique entries per week.	50% to 59% consistency of updates of artefacts throughout the semester based on 3 unique entries per week.	Less than 26 entries in the portfolio.
<b>Quality of artefacts entries (max 20)</b>	Above 80% of the top 20 self-identified artefact entries show that the student has in-depth appreciation of the course contents.	60-80% of the top 20 self-identified artefact entries show that the student has in-depth appreciation of the course contents.	40%-60% of the top 20 self-identified artefact entries show that the student has in-depth appreciation of the course contents.	30%-40% of the top 20 self-identified artefact entries show that the student has in-depth appreciation of the course contents.	Less than 30% of the top 20 self-identified artefact entries show that the student has in-depth appreciation of the course contents.
<b>Organisation of portfolio (max 20)</b>	The portfolio is extremely well-organised.	The portfolio is generally well-organised and easy to navigate.	The portfolio is organised fairly well. There is some difficulty navigating.	The portfolio is not well-organised. Navigation is difficult.	The portfolio is not organised.
<b>Presentation (max 40)</b>	The student demonstrated originality and content integration in articulating the learning experience gathered through the portfolio.	The student demonstrated some originality and content integration in articulating the learning experience gathered through the portfolio.	The student demonstrated some content integration in articulating the learning experience gathered through the portfolio.	The student did not demonstrate originality and content integration in articulating the learning experience gathered through the portfolio.	The student did not coherently articulate the learning experience gathered through the portfolio.