Syllabus

BIS3061 Internet of Everything

Kevin Johnston

Summer Semester 2023

Level	Bachelor	
Credits	3 ECTS-credits	
Student Contact Hours	compressed format – see online timetable LSF [equivalent to one session of 90 minutes each per week]	
Workload	90 hours, 30 hours within class, 60 for self-study	
Prerequisites	Proof of English language skills. A laptop with a microphone and camera, high-speed internet, Moodle and MS Teams.	
Time	Fridays from 17:15 to 18:45, PLUS two Saturdays 29 April and 06 May details see online timetable LSF	
Rooms	See online timetable LSF	
Start Date	**17 March 2023**	
Lecturer(s)	**Name**	Kevin Johnston
	Office	
	Virtual Office	MS Teams
	Office Hours	Fridays from 13:00 to 17:00 by appointment
	Phone	+27 (83) 415 0892
	Email	Kevin.johnston@uct.ac.za

1. Summary

The course aims to provide students with an understanding of the complexities and issues involved in the Internet of Things (IoT). The Internet of Things is continually expanding, and business and IT professionals need to understand what IoT is, how it works, what is the potential of IoT, and how to use IoT to improve business. The course will examine the broad concept of IoT in business, then the sensors and devices (the 'things') that make up the IoT, how these things are programmed, how the data is gathered and analysed, how the components are networked together, how cybersecurity is handled, and where the components sit. Then how to manage IoT projects and the change they create, how to manage innovation, and how to design will be briefly addressed. Finally, the challenges and value add of IoT will be examined.

2. Outline of the Course

The course is based on the Internet of Things (IoT), information technology and management issues as at 2023.
All students will be expected to participate in the discussions, and will be evaluated on their contributions made in class. All students are expected to bring AT **LEAST ONE mobile device** to each seminar, which MUST be on at all times.
All students will be expected to read, research, pose **problems** and questions, develop and **submit answers** to questions in class. The instructor may give guidelines and additional literature sources.
One or more students will be pre-selected to source a **video** (**maximum of 5 minutes**) which explains the topic, and to generate a relevant question related to the topic. The question must be submitted to a version of ChatGPT for an answer. The student(s) must then Appraise (judge) the answer supplied by ChatGPT based on several key factors.

DURING each Seminar (90 minutes):

1. The instructor will usually give a **lecture** of **maximum 45 minutes**. The lecture will provide theoretical background and raise questions.
2. The pre-selected student(s) will then show a **5-minute (maximum) video** they have sourced on the topic to the class.
3. The pre-selected student(s) will then show the Question they generated to a version of ChatGPT, plus the Answer and their Assessment of the answer.
4. There will then be an **open session** of maximum **10 minutes** to discuss, ask and answer questions on the **topic.**
5. There will then be exercises and/or activities for **30 minutes.**

The seminar approach is based on interactivity, so each student should come prepared by having read the reading(s), and prepared answers and questions.

3. Course Intended Learning Outcomes and their Contribution to Program Intended Learning Outcomes / Program Goals

Note: Where Learning Outcomes share an assessment, the percentage for that assessment is only shown the first time the assessment is mentioned.

Program Intended Learning Outcomes		Course Intended Learning Outcomes	Assessment Methods			
	After completion of the program the students will be able…	After completion of the course the students will be able ….	Presentation	Project	Essay	Presentation
			50%	10%	20%	20%
			Collective	Collective	Individual	Individual
1	**Expert Knowledge**					
1.1	…to demonstrate their distinguished and sound competencies in General Business Administration.	… to understand what the Internet of Things (IoT) is all about. … to appreciate how IoT can add value in businesses	X			
1.2	...to solve business problems based on profound data research skills and by applying quantitative methods.	… to explain the relationship between business requirements and the potential of IoT solutions … demonstrate research skills in asking and answering questions in class, developing presentations, and in sourcing videos.	X			X
2	**Digital Skills**					
2.1	...to know and understand relevant IT software tools used in business and their features and have a solid understanding of digital technologies.	…to identify the current sensors and devices available and in use in IoT …to be aware of the programming and software required in IoT …to understand and apply design and design concepts concerning IoT … to appreciate and be able to apply Big Data, Analytics and Business Intelligence in IoT projects … to appreciate the networks, and standards associated with IoT projects … to understand where IoT exists, both in and on the edge of the cloud … to understand and be able to apply Project and Change Management … to have an understanding of Innovation Management	X	X		X
2.2	...to effectively use and apply information systems to develop solutions in business settings.	… to develop and present an innovative IoT project	X	X		X
3	**Critical Thinking and Analytical Competence**					
3.1	...to implement adequate methods in a competent manner and to apply them to complex problems.	… to work in teams through two workshops, one on design thinking and one on innovation using IoT	X	X		
3.2	...to critically reflect and interpret findings and to de-	… to submit a reflection at the end of the course			X	

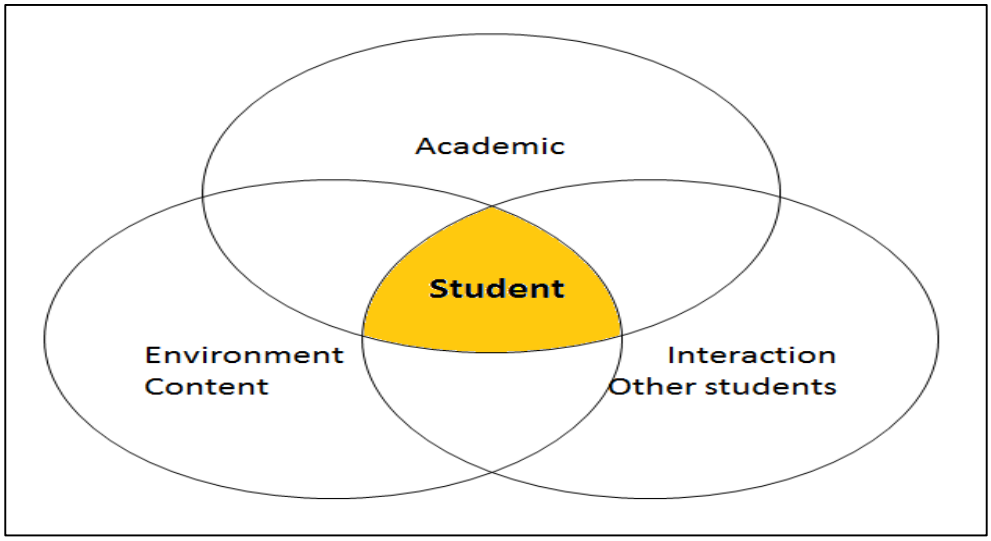
	velop comprehensive solutions for complex problems.					
4	**Ethical Awareness**					
	...to develop sound strategies in the areas of ethics, sustainable development and social responsibility and are able to apply them to typical economic decision-making problems.	… to appreciate issues of privacy and the need for ethical behaviour, and to understand and develop strategies to deal with these issues. … to identify and analyse IoT security and privacy risks	X			
5	**Communication and Collaboration Skills**					
5.1	...to express complex issues effectively in writing.	… to act as a scribe by taking notes during a lecture			X	
5.2	...to demonstrate their oral communication skills in presentations.	… to work in a team to create and present an IoT concept design that solves a problem, is ready to prototype and test.	X			X
5.3	...to work successfully in a team by performing practical tasks.	… to work in a team to create and present an IoT concept design that solves a problem, is ready to prototype and test.	X			X
6	**Internationalization**					
6.1	...to understand and explain business challenges in an international context.	… to understand challenges in designing, implementing, and managing IoT	X			X
6.2	...to articulate themselves in a professional manner in international business.	… to work in a team to create and present an IoT concept design	X			X

4. Teaching and Learning Approach

I expect each of us to learn and grow during our time together. I do not believe anyone knows all the answers, but I believe that everyone has questions. I believe that learning begins with an inquiry, with questions. I hope to get students to develop and ask questions that stimulate debate, provoke reflection, get useful information, and initiate action.
I believe that there are no stupid questions, only stupid answers. I wish to make students comfortable to ask insightful questions.
If you have any problems or questions, please speak up, or e-mail as soon as you possibly can. The longer you wait the fewer options we have to help you.

The course is as Green as possible, there are no paper hand-ins or hand-outs – all deliverables and documents are electronic on Moodle.

The course follows a constructivist learning approach, which puts the student at the centre of active learning as shown below. Learning is not a passive activity in which students acquire knowledge, rather it is an active approach in which students find, contextualize and process information to construct knowledge. The student is expected to draw on their personal experiences, interact and draw on the personal experiences of fellow students, interact with the academic, and the environment to source information and to develop knowledge.



This course uses five approaches to ensure the student is active in constructing knowledge.

1. Supported learning – providing scaffolding and bite-sized chunks plus feedback. Students are provided with readings.
2. Exploratory learning – students are encouraged to explore and discover new knowledge, to source videos.
3. Collaborative learning – students obtain multiple perspectives and critical thinking skills, and collaborate in teams to produce presentations.
4. Problem-based learning – students are encouraged to post problems, questions as well as answers on the topics.
5. Evidence-Based Management (EBM) or practice, which uses four main sources of evidence: Scientific literature, Professional expertise, internal organisational data, and Stakeholders values and concerns. The EBM approach is Ask, Acquire, Appraise, Apply and Assess.

5. Literature and Course Materials

There is no prescribed textbook; students are expected to find and read a range of Journal articles and academic literature on the internet. The course is based on the issues raised in academic and industry research. Students will need at least one mobile device connected to the internet in all classes.

6. Assessment

1	**Discussion & Questioning Forums**	10%	24 hours after seminar
2	**Individual Reflections**	10%	24 hours after seminar
3	**Video & ChatGPT** in Seminars	10%	24 hours prior to seminar
4	**Workshops** (two submissions 10% each)	20%	6 hours after workshop
5	**Project Presentation (in teams)**	50%	12h00 on 07 Dec
	Total	**100**%	

Marks are gained from each activity performed.

6.1 Discussion & Questioning Forums (10%)

Participation by students in discussions and questioning is core to this course. **All students are expected to participate in EACH of the DISCUSSION & QUESTIONING FORUMS, by making submissions (questions, answers, articles, videos)** relevant to the topics under discussion. Students should be prepared to ask questions and give answers. All students will be expected to participate in ALL of the discussions, and will be evaluated on their submissions. Asking questions is an important part of this course. Students will not gain marks simply by asking an obligatory question or two, nor will marks be based on the number of questions or comments made. Marks will be gained by asking open ended questions which cause fellow students to think and grow. Participation grades will reflect the total impact the student has had on the class over the course, through significant and insightful comments, and a demonstration of good problem-solving and analytical skills. Finding relevant and recent papers and or videos and sharing these with the class will be rewarded.
In each Forum, students may conduct research into one or more of the topics of the block and find a high-quality, relevant article or video (the video must be no longer than 5 minutes) on the given topic. Submit the link to the article/video in the forum, and critically evaluate the article/video using the CRAP test. View your peers' contributions in the forum, then share your thoughts by questioning and commenting on the posts (you must comment on at least two other submissions) and vote for those that you think are the most informative by liking the post. You may also ASK questions related to the topics in the Block, and ANSWER questions posed. **DUE 24 hours after the last seminar in the block.**
Each question and answer will be assessed and given a mark (1-5), based on the following criteria:

5 - Excellent, demonstrates knowledge, understanding, insight, and or creativity.
4 - Very good, could be clearer and or shorter but covered key points, one or two minor faults/omissions.
3- Good answer, most points covered, shows some knowledge of the subject matter, perhaps some application.
2- Shows some knowledge of the subject matter, but no application.
1- Meaningless, nothing relevant, a token gesture.
0- No submission.

6.2 Individual Reflections (10%)

Reflection is not simply reporting events or presenting the opinions of others. Reflection is your **OPINION**, your **THOUGHTS**, your **FEELINGS**, your **OBSERVATIONS**, reflection shows some analysis, explores motives for views/behaviour, reflection can be critical of views/actions. Reflection contains an element of 'standing back' from an event/issue, and reflection recognizes that one's frame of reference can change. Reflection also takes the views and motives of others into consideration, and considers them against one's own views and motives. Reflection recognizes that previous experience, thoughts, socialization, background etc., interact with the production of one's own behaviour.

Reflective practice is an essential skill, and one that is often overlooked by those in a position of leadership. You will be given the opportunity to hone your skills of critical reflection in each Block. Engaging in regular reflection allows for insight into your experience in the workplace, which can be translated into practical steps towards your own personal and professional development. This reflection will illuminate areas in which growth is needed, while highlighting strengths and successes.

Each of the reflections should be 100–200 words. DUE 24 hours after the last seminar in the block.

An interesting site to look at is https://www.reboot.io/.

An interesting book to read is Colonna (2019). Colonna, J. (2019). Reboot. Leadership and the art of growing up. Harper Business, New York.

Reflection requires us to think about the past, in the present, and apply what we are learning to the future.

Students are expected to submit reflection pieces (each of a maximum of 400 words) after each Block. Students are invited and encouraged to reflect on issues such as:

a. What are the two-four most important things I learned in this block?
b. Did the block change any of my opinions, which ones, and how?
c. What outstanding questions or unaddressed critical issues do I have?
d. Did anything relate/agree/disagree with any of my experiences?
e. What (if anything) would I consider doing differently?
f. Does this refute or support what I already know?
g. How is this relevant to what I may be working on?
h. What could/should I do with this information?
i. Can this become relevant to my future projects?
j. Is the information presented objectively?
k. What can I learn from this?
l. Do I need a fragment or the whole thing?

Each reflection will be assessed and given a mark (5-1), based on the following criteria:

5 - Excellent, critical reflection which takes account the socio-political context in which events take place and decisions are made (roles, relationships, responsibilities, gender, ethnicity, etc.).

4 - Very good, a dialogic reflection which is a form of discourse with one's self, mulling over reasons and exploring alternatives (I wonder...? perhaps ...? maybe...?).

3- Good, descriptive reflection which provides reasons (often based on personal judgement), although only in a reportive way (I did x because y).
2- Fair, descriptive, but not reflective, merely reporting events with no attempt to provide reasons (I did x; s/he said y).
1- Poor – neither descriptive nor reflexive.
0- No reflection.

6.3 Video & ChatGPT in Seminars (10%)

The student(s) must carry out a focused search for a **recent** and **relevant** academic/business video which contains a succinct, focused and relevant **contextualization** and **definition** of the topic. The **URL** of the Video plus **CRAP** test must be emailed to the academic at least **24 hours prior to the seminar**.

Videos will be marked according to the following table:

Excellent 5	**Very Good 4**	**Good 3**	**Fair 2**	**Poor 1**
An excellent video containing a succinct focused and relevant contextualization and definition. Key concepts identified and explained.	A very good video containing clear and relevant contextualization and definition. Key concepts identified and explained.	A good video containing good contextualization and definition. Key concepts identified and explained, with a small amount of irrelevant material.	A video which is weak in contextualization, and definition. Key concepts not clearly identified or explained.	A poor video which is unclear or poor in contextualization, and definition. A fair amount of irrelevant material.

The student(s) must generate a **relevant question** related to the **topic**. The question must be submitted to a **version of ChatGPT** for an answer. The student(s) must then **Appraise (judge)** the answer supplied by ChatGPT based on several key factors.

These factors include:
Relevance: Is the answer relevant to the question that was asked?
Accuracy: Is the information in the answer accurate and well-researched? Are any sources cited to support the information?
Clarity: Is the answer clear and easy to understand? Does it use language that is appropriate for the audience?
Completeness: Does the answer provide all of the information that is necessary to fully address the question?
Objectivity: Is the answer impartial and free from personal bias or opinions?
Credibility: Is the answer based on credible sources and evidence?

By evaluating an answer based on these factors, one can determine its quality and accuracy, and make an informed decision about how well it answered the question.
Appraisals will be assessed according to the following table:

Excellent 5	**Very Good 4**	**Good 3**	**Fair 2**	**Poor 1**
Excellent appraisal containing a succinct, fo-	Very good appraisal containing a clear and relevant	Good appraisal containing a good determination of answers	Weak appraisal which failed to deter-	Poor appraisal which failed to determine the answers quality

cused and relevant determination of answers quality and accuracy, and an informed decision about how well it answered the question.	determination of answers quality and accuracy, and an informed decision about how well it answered the question.	quality and accuracy, and a decision about how well it answered the question.	mine the answers quality and accuracy, and a poor decision about how well it answered the question.	and accuracy, and a poor or no decision about how well it answered the question.

The **Question** to a version of ChatGPT, plus the **Answer** and the **Assessment** of the answer must be emailed to KJ 24 hours prior to the seminar.

6.4 Workshop Submissions (20%)

The two workshops involve teamwork. Marks for teamwork is to be **shared equally** among all members of the team. Students will work in teams to complete and submit work for two workshops. Each workshop is to count 10% to the total mark. Details of each workshop will be handed out in the seminar, together with a document to submit work completed. The deadline for document **submission will be 6 hours after the workshop** – no late submissions will be considered. An important aspect of the deliverable is how the data is managed and organized.

Each workshop will be assessed and given a mark (1-5), based on the following criteria:

5 - Excellent, demonstrates knowledge, understanding, insight, and or creativity.
4 - Very good, could be clearer and or shorter but covered key points, one or two minor faults/omissions.
3- Good answer, most points covered, shows some knowledge of the subject matter, perhaps some application.
2- Shows some knowledge of the subject matter, but no application.
2- Meaningless, nothing relevant, a token gesture.
0- No submission.

6.5 Project Presentation (50%)

Marks for teamwork and team presentations are to be **shared equally** among all members of the team. Students will work in project teams to become familiar with the relevance of IoT. The presentations should be **structured**, and **applied,** and include an **e-Poster**. The presentations may use relevant theory or models. The presentation must be complete in a maximum of 20 minutes. **Presentations and e-Posters must be emailed to KJ by 12h00 on Thursday 22 June 2023.** Points are awarded based on a 5 (or 10) point scale, where 1=poor, 2= fair, 3= approaches expectation, 4= meets expectation, and 5= exceeds expectation.

Issue	Mark
Presentation (25%)	**/25**
Visual Aids/Delivery	1-5
Structure – introduction, conclusion, storyline	1-5
e-Poster - Title, Aim/motivation, Value	1-10
Time Keeping (maximum 20 minutes)	1-5
Content (75%)	**.../75**
Overview (Background, creative idea, problem statement, purpose, business, justification & potential benefits)	1-5
COLLECT - IoT Devices (clear statement of sensors and devices (Things) to be used, for what should be related to the problem & realistic)	1-10
CONNECT - NW & CLOUD (clear statement of how Things associated with the project are to be connected, Platform you plan to use, What CC and Edge you plan to use and why?)	1-10
ANALYSE – Big Data, Analytics, Programming & Software (clear statement of the analysis and Insights expected for the IoT project)	1-10
ACT – Programming, Software & Business Intelligence (clear statement of what SW you plan to use and for what, Business Intelligence and Actions expected for the IoT project)	1-10
Security & Privacy in the IoT (a clear statement about the security and privacy implications of the IoT project)	1-5
Project Management (a clear statement about the PM you plan to use, a project plan)	1-5
Empathy Map of a typical user(s)	1-5
Value, **benefit**, and **innovation** of IoT Project - expected contributions (WIIFM?)	1-10
Presence, interest, variety, appeal, quality, humour	1-5

7. Schedule

The planned schedule is as follows:

Day; Date; Times	#	Topic [90 min each]
Fri; 17/03; 17:15 18:45	1	Introductions/Preliminaries/Project allocations
Fri; 24/03; 17:15 18:45	2	IoT Architecture & Business Processes
26-Mar-23		**Time Changes by 1 hour forward**
		Easter Break 06 Apr- 11 Apr
Fri; 21/04; 17:15 18:45	3	Project Management & Draft 10:30
Fri; 28/04; 17:15 18:45	4	Innovation Management & IoT Game 12:15
Sat; 29/04;	5	UI, UX, CX & Design Thinking
Sat; 29/04;	6	Design Thinking Workshop
Sat; 29/04;	7	IoT Sensors & Devices
Fri; 05/05; 17:15 18:45	8	IoT Networks & Platforms
Sat; 06/05; 17:15 18:45	9	IoT on the Edge of the Cloud. Q&A
Sat; 06/05; 17:15 18:45	10	Programming & Software
Sat; 06/05; 17:15 18:45	11	IoT Big Data, BA, BI & DS
Fri; 12/05; 17:15 18:45	12	IoT Security & Risk
		Pentacostal Break 29 May- 02 June
Fri; 09/06; 17:15 18:45	13	IoT Value
Fri; 16/06; 17:15 18:45	14	Privacy & Ethics
Thu; 22/06; 12:00		Presentations & e-Posters emailed to KJ
Fri; 23/06; 17:15 18:45	15	Project Presentations (20 min each)

8. Academic Integrity and Student Responsibility

The University considers **plagiarism** to be the **deliberate passing off of another person's work as though it was your own**, and will **NOT be tolerated**. **At the very least, you would get zero for your work, and we would request that you withdraw** from the Course**.**

Since so much of the course mark is awarded for work done outside of our direct control, a great deal of trust is involved. We, therefore, view plagiarism in the same way as we do cheating in examinations. Similar rules apply to all student work such as projects, essays and other assignments.

Some examples of what we would consider being plagiarism are:

- You **downloaded** material from the Internet and submitted it as your own work
- You downloaded material from the Internet and **copied** whole **paragraphs** or pages of text into your assignment, but you edited them slightly so they fitted in. You might have written other parts of the assignment yourself, but chunks of it are made up of copied material.
- You found a few articles or books that say everything you need. You designed the structure of the assignment yourself and wrote quite a bit of it. But one or two sections are almost **word-for-word** from the articles or books you used. You did this because they said things in a way you felt you could not improve upon.

- You acquired assignments from previous year's students and used them in the manner described above.
- Someone else wrote all (or part of) the assignment or project for you, either as a favour or for some kind of reward.
- Falsifying or manufacturing (creating) of any data.
- Using AI tools such as ChatGPT without acknowledging the tool(s).

So what would the consequences of plagiarism be? At the very least, you would get **zero for your assignment/submission**, you will have to **appear before the Dean**, and we would request that you **withdraw from the Course**. In cases where blatant copying has taken place, we would take disciplinary action, which could result in **suspension or expulsion** from the University.

What is acceptable?
Part of the objective of the course is for you to find lots of other material. All we ask is that you use it in an ethical, honest and scholarly way. This requires you to be able to analyse and discuss a broad selection of the material you found, and that you *reference* the material you use!

Acceptable use of another person's material at undergraduate level means that the assignment structure, layout and contents are all your own work. AND
- You used no more than one directly quoted paragraph per page, and you referenced the author as per APA 7th guidelines
- You used ideas, phrases, concepts, diagrams and statements already stated by others, but you rewrote them in your own words AND you referenced them
- You have quite a lot of references on each page, but they are taken from several different sources. (If they are all from the same source, then you have relied too heavily on that source!)

9. Code of Conduct for online Teaching

Link to the Code of Conduct for online Teaching

10. Teaching Philosophy

The course follows a constructivist learning approach, which puts the student at the centre of active learning as explained in the Teaching and Learning Approach section.

11. Additional Information

Prof. KA Johnston will be available before and after seminars. For a meeting please email kevin.johnston@uct.ac.za or WhatsApp +**27 (83) 415 0892.**

12. Disclaimer

While every effort has been made to be as accurate as possible in this document, it sometimes happens that changes occur – particularly dates. If in doubt, please check with Kevin Johnston or the Course Administrators.