Choose Your Theme

0LVX10 - ITEC Ethics of Technology and Engineering
Quarter 4 2023/24

Students who follow **ITEC Ethics of Technology and Engineering in Quarter 4 of the current academic year** can choose a theme, they would like to follow. (Students who follow the same course in in quarter 2 of the *next* academic year will be able to choose a theme at a later date at the beginning of the next academic year.)

Starting **November 21**st you can choose which theme you would like to follow in the ITEC Ethics of Technology and Engineering Course. **Students will be distributed on a "first come first serve basis", so make sure to indicate your preference in time!** Please indicate your choice **before 1**st **of February 2024.** It is still possible to register after that, but an early registration helps us to solve our logistics puzzle in time.

Who can choose a theme now?

- **Students who follow ITEC Ethics this academic year in quarter 4.** (This applies to students from Applied Mathematics; Applied Physics; Architecture, Urbanism and Building Sciences; Biomedical Engineering; Computer Science and Engineering; Industrial Design; Industrial Engineering; Mechanical Engineering; Medical Sciences and Engineering; Psychology & Technology; Sustainable Innovation)

Who can not yet choose a theme?

- **Students who follow the course in quarter 2 of the next academic year (2024/25) will be able to choose a theme at a later date.** (This applies to students from Automotive Technology, Chemical Engineering and Chemistry, and Electrical Engineering)

Why choose a theme?

ITEC Engineering Ethics is coming up in quarter 4. We offer different themes that you can choose from. All themes will investigate the relation between technology and society and will have the same overall set-up (e.g. group-work, assignment, learning goals). Themes differ with regard to which technologies they focus upon. **You can find the general ITEC Ethics course description on OSIRIS (course code: 0LVX10).**

Which themes can you choose?

- Below you'll find the themes you can choose from. Each theme is described briefly in this document. We encourage you to choose the theme you find most interesting, even if it may lay outside of the focus of your study-program.

- If you want to know more about the course and the learning objectives of ITEC Ethics in general, please consult the course description on OSIRIS (0LVX10).
- At the end of this document, you find some frequently asked questions.
- You also find a list of the best evaluated themes according to students of the different programs (based on the student evaluation of similar themes in the old USE Base Course of last year).

If you are an external student and cannot enroll, also contact us via a.spahn@tue.nl

ITEC Ethics of Technology and Engineering is offered in different time slots, depending on your study-program. This is to make sure that the course does not overlap with other courses in your program. We ask you to choose a theme in your time slot.

Choices in Slot A
If you are enrolled in one of the following study programs, you can choose a theme in SLOT A: • Applied Mathematics • Applied Physics • Computer Science & Engineering • Industrial Design The topics you can chose are: • Behaviour Change Technologies • Disruptive Technologies • Ethics of Digital Futures and AI

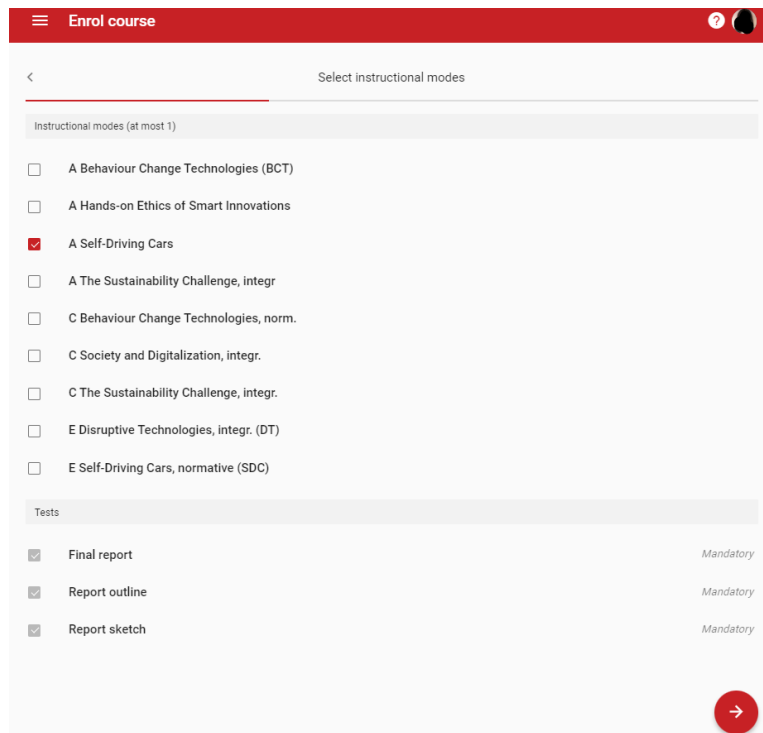| Choices in Slot E |
| --- |
| If you are enrolled in one of the following study programs, you can choose a theme in SLOT E:

• Architecture, Urbanism & Building Sciences
• Biomedical Engineering
• Innovation Sciences
• Industrial Engineering
• Mechanical Engineering
• Medische Wetenschappen en Technology
• Psychology & Technology

The topics you can chose are:

• Behaviour Change Technologies
• Disruptive Technologies
• Ethics of Digital Futures and AI
• Self-Driving Cars
• The Sustainability Challenge |

How to register for your choice?

- **Check in which time slot ITEC is planned for your program (see table above, page 3)**
- Open OSIRIS
- Go to "register"
- Search for the ITEC Engineering course code (0LVX10)
- You need to choose a theme and enrol in a tutorial group for this case (see screenshot below)
    - For the choice of **theme**: select the theme by clicking on the check-box next to it.
    - For the choice of a **tutorial-time**: select a tutorial group from the drop-down menu at the top of the screen ("Select your group preferences"). Select the group-number of the tutorial-time you want to go to (the times of the tutorial are given under "remark").
    - Lectures will be scheduled for Mondays 1&2 or Mondays 3&4 (Slot A), and Tuesdays 5&6 (Slot E). You will be automatically enrolled in the lecture.
- Click on "register" on the top or bottom of the screen to register your choice.
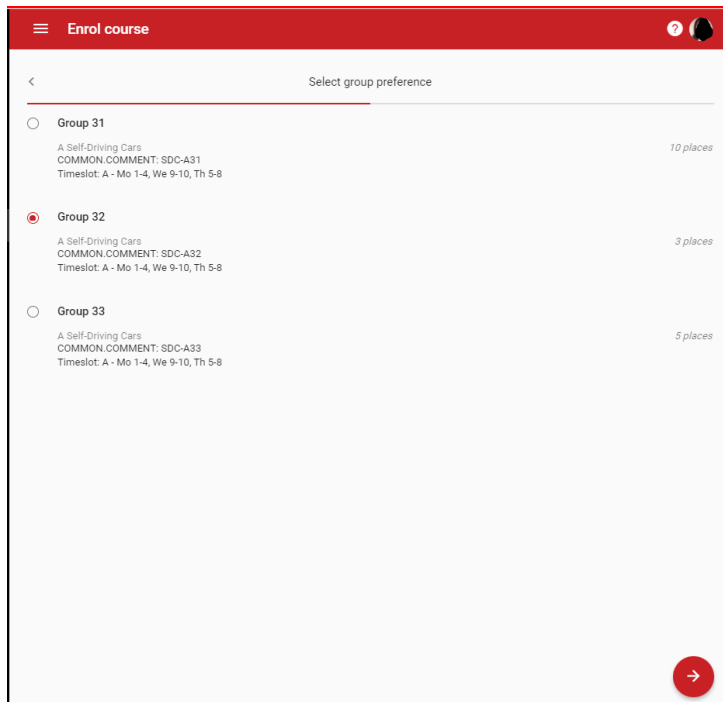
How to register (Example)

1. Choose your Theme

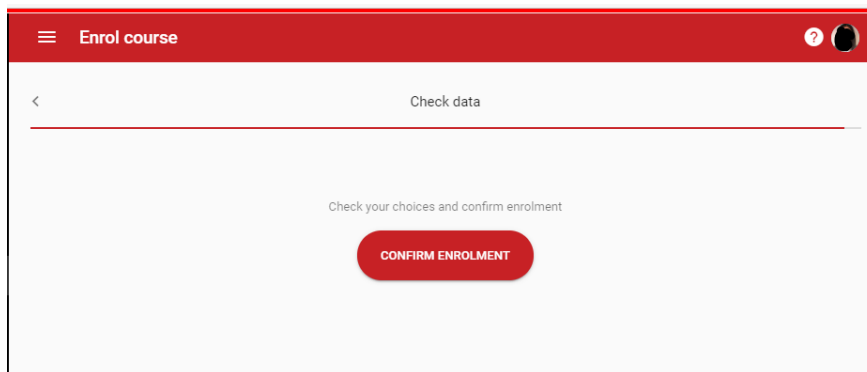*The screenshot is from last year. The list of topics will be different this year.*

2. The available groups and places are shown, choose your group

3. Check data and confirm enrolment

Behaviour Change Technologies

Time: You can follow this theme either in **Slot A** or in **Slot E**

Technology changes human behaviour in many different ways. Behaviour change technologies (BCTs) are devices or technological systems intentionally designed to induce behaviour change in users. The primary purpose of the BCTs is behaviour change; it is not merely a side effect. These technologies are being used and developed in many domains, from health to education, from workplace safety to environmental conservation.

Our daily lives are filled with examples of the growing influence of BCTs: Our cars prompt us to put on our seat-belts; our smartphones remind us to take our medicines; wearables push us to exercise more; dedicated apps and e-coaches are available for almost all of our daily activities, trying to help us to live in accordance with our own values or in line with societal expectations.

Source: Pexels.com

It is important for engineers to identify the potential of these technologies, but also take into account important moral issues, such as autonomy, privacy, trust, and responsibility. On the one hands BCTs try to help user's reach their goals, on the other hand they seem to interfere with freedom of choice and autonomy of the user. BCTs promise to make us healthier, happier, and better off in many ways. Some of these benefits are primarily aimed at the individual, while others are projected benefits for society as a whole. Lowering the cost of chronic disease by enabling patients to better self-manage may provide a societal benefit by reducing long term health care costs. But what is good for the individual is not always what is good for the group, and vice versa. BCTs must frequently rely on collecting large amounts of personal data to be tailored to users' contexts in order to make them more effective and less intrusive. Significant ethical concerns are raised by the ways in which personal data are collected, stored, reused, sold, and processed.

Students will work together in groups on one of the cases below. In tutorials will apply the materials of the lecture to concrete cases of recent and/or emergent technologies. You will be jointly working on a report on your case, in which you identify the most relevant stakeholders and give advice on how to solve ethical challenges BCTs raise.

Cases you can work on:

- Robots implementing affective computing systems to promote sharing in children
- The Procaster app aims to reduce your procrastination behavior and make you more productive. Users can check their statistics for personal productivity over time, which may provide motivation to get into the productivity zone.
- The app Fighter, Not Killer aims to teach militants to behave better in war zones and raise awareness about the humanitarian norms of war and protection of civilians.

- The Koda Quest – A Fingerprint Network app aims to teach young kids a sense of responsibility and ethical awareness through games.
- Wearable activity trackers or smartphone apps (e.g. Strava app, Nike Training Club app, or 5K trainer app).
- Gamification BCTs for mental health (e.g. Happify app) or for physical health (Pokemon Go)
- Persuasive architectural design to stimulate physical activity (e.g. stimulating people to user stairs instead of elevators)
- The Sobriety Counter is an app that stimulates people to drink less alcohol, e.g. if you have an urge to drink you can play a game that helps to pass the 3-minute mark to beat your desire and stay sober.

Students are free to suggest their own cases, if they fit with the overall theme (check with your tutor!).

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Disruptive technologies

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Time: You can follow this theme in **Slot A or E**

Startup companies with a great tech idea use the word "disruptive" as a marketing buzzword. But what is behind this word? In the ITEC theme you will learn to see disruption in new and insightful ways.

Novel technologies can provide business opportunities, solve social problems, and allow users to do new things. However, even with clear expectations and active participation of a broad range of actors, new technologies often develop differently than expected and can radically change current

Source: Philip Birmes, Pexels.com

practices, sometimes on a global scale. As Uber has shown us, some technologies have massive effects on entire industries, putting people out of work and changing our ethical worldview along the way.

Disruption is also global. Worldwide internet-based infrastructure, global branding, and innovative business models are part of the recipe for disruptive innovation across global markets. We invite you to consider the ethical implications of these innovations for society, especially the creation of risks and uncertainty for local stakeholders and benefits and opportunities for others, sometimes located far away.

This ITEC course will shed light on disruptive technologies and practices, relating them to daily life and engineering. Working on your own case, you will learn to diagnose responsibility gaps for risks and uncertainties and make evidence-based recommendations for addressing ethical risks in technology and its development. Based on these insights you will formulate an advice statement and integrate this in a video clip presenting your group's advice. The course is set up as a project with a group assignment with individual parts. The lectures, in-class activities, and tutorials guide you through the assignment.

Cases you can work on:

Students can choose their case, focusing on a potentially disruptive technology, such as:

- Surveillance technologies (e.g., facial recognition)
- Platform economy technologies
- Changes in mobility services: Uber, e-bikes
- The disruptive impact of new social media (Twitter/X, Tik-Tok, etc.)

- General artificial intelligence

The chosen case should be somewhat realistic and should be at least partly implemented in the real world, so that there is evidence about its (likely) effects and possible implementations.

Ethics of Digital Futures and AI (normative)

Time: You can follow this theme in **Slot A or Slot E**

This theme will focus on the ethical issues of digitalization, big data and artificial intelligence. It will thus focus on the normative perspective in depth.

Digitalization is currently one of the main drivers of technological change. Hand in hand with digitalization goes the phenomena of data collection: data on others, data about ourselves, data on the environment and data on the social, cultural and economic world we live in. Connecting these data streams opens the
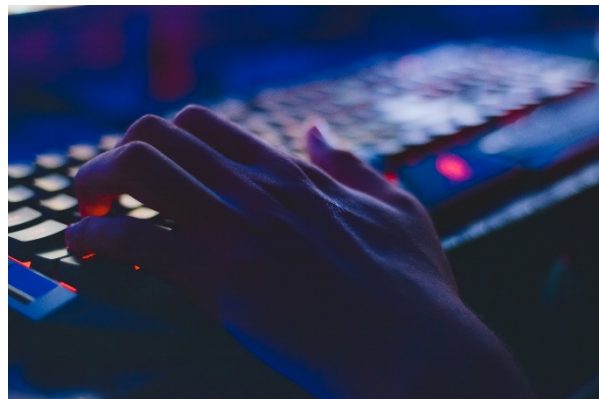
Source: Pexels.com

possibility to delegate more and more decision-making to automated decision systems. What seemed to be science fiction scenarios just some decades ago has now become reality in self-driving cars, stock-trading algorithms, dating platforms and automated weapons. It is important for engineers to identify the potentials of these technologies, but also to take into account problems that arise for societies through increasing digitalization.

The lectures of the normative track will sketch the ethical issues that are at stake when we develop and use modern digital technologies and AI. Readings will mainly be selections from introductory textbook(s). You will analyse the most pressing ethical issues of digitalization. You will be jointly working on a report on your case, in which you give advice on ethical challenges of digitalisation.

Cases you can work on:

Possible cases for student group-work in the tutorials might include (basis for assignment):

- Social Scoring Systems: between Trust Building and Social Exclusion
- Data Ownership and Cloud Computing: between Safety and Privacy
- Predictive Policing: between Security and Human Rights
- Social Networks: between Information and Manipulation
- Artificial Intelligence and Smart Technologies: between Friend and Foe
- Digital Video Technologies: between Virtual Reality and Deep Fakes

Self-Driving Cars

Time: You can follow this theme in **Slot E**

In the 1982 science fiction movie *Blade Runner*, many scenes feature imagined cars of the future. Those envisioned cars of the future were flying cars, but they still required a driver. The interior of the car looked more like a modern fighter jet than anything else. Today, in 2018, the vision of the future car is a driverless car. The future car we imagine today will be safer, more comfortable, more fuel-efficient, and more environmentally sustainable than any currently existing car. That is the ideal. Some of the challenges to attaining this ideal are technical. Other challenges are social and ethical. This ITEC-theme will focus on current social and ethical challenges.

Source: Tookapic, pexels.com

Recently, the year 2016 marked a key turning point in the development of driverless cars. There had already been some minor crashes with self-driving cars in 2015. But in 2016, it for the first time happened that an experimental Google car was to blame for a crash. Later in 2016 – in May – the first person was killed while riding in a car operating on "autopilot": a Tesla model S crashed into a truck. In 2018, in turn, a pedestrian was killed by self-driving car when a self-driving Uber car crashed into a pedestrian in Arizona. What these incidents show is that the issue of possible crashes and problems with driverless cars has gone from being a hypothetical thought experiment to being a real-world issue.

In this ITEC-theme, we will explore questions such as the following: if a crash is unavoidable, and all options open to a car put different people at risk, what should a self-driving car be programmed to do? If there is a crash, who should be held responsible? If self-driving cars soon become much safer than regular cars, should we forbid people from using regular cars? What kinds of extra safety-precautions might society require that drivers of regular cars use if they want to continue using conventional cars? How do we deal with mixed traffic between self-driving and regular cars?

Students will learn about recent psychological research on people's attitudes about self-driving cars and safety, about recent ethical and philosophical research about the future of cars, as well as about recent legal discussions about the future of the car. Students will investigate real-world problems and challenges that society already faces in relation to the car of the future. And they will be introduced to ethical theories they can use to analyze these challenges.

Cases you can work on:

Possible cases for student group-work in the tutorials (basis for assignment):

- The ethics of crash-algorithms: how should self-driving cars be programmed to crash in cases where different people are at risk?
- Responsibility for autonomous machines: who should be held responsible if autonomously operating vehicles injure or kill people?
- Safer cars and the choice between different types of cars: how could we justify choices between self-driving cars and regular cars once both options are available, especially if they differ in how safe, fuel-efficient, and environmentally friendly they are?
- The ethics of mixed traffic: how can we create well-functioning traffic involving both regular cars and autonomous cars (with different levels of automation)?

Students can also come up with cases of their own, if they fit the overall theme.

The Sustainability Challenge

Time: You can follow this theme **in Slot E**

Sustainability is one of the great challenges of our time. According to many, technology is part of the problem (e.g. by producing today's carbon-emitting industry, mobility and energy systems) and therefore also a necessary part of the solution. Engineers thus work on a wide range of innovative solutions (see for example TU/e research on Energy, Smart Cities and Smart Mobility). In fact, engineering academies have translated the socio-ecological problems of the 21st century into 'grand challenges for engineering' that need solving in order to preserve an inhabitable planet.

In this ITEC theme, your student group explores relevant ethical and societal issues for a selected sustainable innovation case. We ask you to do a normative analysis (which ethical values and value conflicts are at stake in the ongoing energy transition, and how can we evaluate different engineering solutions from this perspective using ethical theory?) of your selected case, and come up with recommendations to relevant stakeholders.

The group assignment work is supported by inputs through lectures and readings, and by different work forms in tutorials

Cases you can work on:

In the group assignment, you connect general reflections of the ethical aspects of the transition towards sustainability to a concrete engineering solution at the 'work floor' that you select as a group. Examples include energy technologies such as wind, solar, hydro, bio-fuels, geothermic, geo-tidal, nuclear fusion and fission. New infrastructures for Carbon Capture and Storage, smart grids and energy storage systems. New sustainable technologies such as electric or hydro powered vehicles new building materials and other relevant technologies that are currently in the application phase.

FAQ: Choice of Theme and Changes in ITEC Ethics of Technology and Engineering

- Where can I find **general information on the course**?
    - Please consult OSIRIS for general information. Course Code 0LVX10

    - **Why should students choose now?**

        - Students will be assigned to the themes on a "first come first serve basis". The earlier a student chooses, the more likely it is that he/she gets the first choice.
        - If (most of the) students choose before February, we still have some time to shift capacity. We can thus better anticipate which topics are popular and try to offer more tutorials on these topics.
        - Students who follow the course in quarter 2 of next academic year will receive an extra document about how to choose a theme before the course starts.

    - **Should departments recommend students a specific choice?**
        - All themes are open for all students. Students can choose based on what they personally find most interesting. It the end of the document you find a list of popular topics for your study program (based on similar topics in the old USE base course)

    - **What if students do not choose a theme before the course starts?**
        - Students that do not choose will be assigned a theme when the course starts.

List themes that were evaluated best per study program in the past

You are free to choose any theme that you prefer. It might, however, be helpful to see which theme students from your department evaluated highest last year. However, please note that in the past these theme were offered in a different course called "USE BASE", which did not only focus on ethics of technology, but also covered history of technology. Results from prior evaluations, might thus not be a perfect match with the re-designed course, which now focusses on ethics of technology. In the table below, we have marked the best evaluated tracks per department with an X.

Again, this table is meant only to inform you about student evaluation of last year, you can of course choose all topics.

	BCT	DT	EDF	SDC	TSC
Architecture, Urbanism & Building Sciences	X		X		X
Applied Mathematics	X	X	X		
Applied Physics	X	X	X		
Biomedical Engineering	X	X			
Computer Science	X	X	X		
Industrial Design	X	X	X		
Industrial Engineering	X	X		X	X
Mechanical Engineering		X		X	
Psychology and Technology	X	X		X	
Sustainable Innovation	X	X	X		X

- BCT = Behaviour Change Technologies
- DT = Disruptive Technologies
- EDF = Ethics of Digital Futures
- SDC = Self-Driving Cars
- TSC = The Sustainability Challenge