

# IGEM UPPSALA INFORMATION 2022

The following is a compiled booklet with valuable information of how the iGEM Project and Course operates here at Uppsala University! Though a long read, it should provide answers to most of your questions!



# IGEM COMPETITION

## **Biggest Synthetic Biology Competition in the World**

**352 teams participated 2021**

**248 teams participated 2020**

**376 teams participated 2019**

## **Promoting**

**Systematic engineering of biology**

**Open source tool boxes**

**Society problems X biotech solutions**



**International Genetically  
Engineered Machine**

iGEM, "Internationally Genetically Engineered Machine", is an annual synthetic biology competition that engages more than 300 student teams from all over the world. Uppsala is joining for the 14th time this year and you have the opportunity to join the team of 2022!

iGEM projects are tackling everyday issues facing the world. A multidisciplinary team works together to design, build, test, and measure a system of their own design using interchangeable biological parts and standard molecular biology techniques. iGEM teams work inside and outside the lab, creating sophisticated projects that strive to create a positive contribution to their communities and the world.

As the 2022 competition website is under construction, we suggest for you to check out the page of 2021 for more information!

[https://2021.igem.org/Main\\_Page](https://2021.igem.org/Main_Page)

## Tracks

- Diagnostics
- Energy
- Environment
- Food & Nutrition
- Foundational Advance
- Hardware
- High School
- Information Processing
- Manufacturing
- New Application
- Open
- Software
- Therapeutics

## Registry of biological parts

BioBricks = parts = functional units e.g. promoters, RBS, terminators, operators etc. teams design and synthesise these

- Interchangeable
- Composable
- Build a new part
- Improve a previous part

## Non-wet-lab requirements

- Human practices
  - Integrated
  - Public engagement
- Wiki
- Modelling
- Presentation and promotional videos

## The main project

The project of choice is meant to solve a problem using synthetic biology or fill a need within the field or might target one of the global sustainability goals (<https://www.globalgoals.org/>). The students of an iGEM team choose their own project with support from faculty and relevant experts.

When it comes to the iGEM competition, there are different tracks to compete in. Those are Diagnostics, Energy, Environment, Food & Nutrition, Foundational Advance, Hardware, High School, Information Processing, Manufacturing, New Application, Open, Software and Therapeutics open. (High school track is not for iGEM Uppsala).

The track in which the project is competing is registered at the end of the summer. This means that it can be “switched” changed during the project development if you come to the realization that another track fits the project better than the one, which was first planned.

You can read more about competition tracks here:

<https://2021.igem.org/Competition/Tracks>

# Registry of Biological Parts

In Registry of Biological parts, the teams try (and hopefully succeed) to create or improve a BioBrick. A BioBrick is an interchangeable and composable functional unit (eg. promoter, RBS, operator...) that can be used to create a device (eg. transcriptional switch, knock-out genes...). This part of the project can be integrated in the main project or as a parallel development. For example, if the main project is about bacteria degrading plastic and you develop/improve a Biobrick enhancing the expression of a given enzyme, that would be a BioBrick design included in the main project.

More info\*:

[https://parts.igem.org/Help:An\\_Introduction\\_to\\_BioBricks](https://parts.igem.org/Help:An_Introduction_to_BioBricks)

[http://parts.igem.org/Main\\_Page](http://parts.igem.org/Main_Page)

*\*these iGEM pages are due to be updated, these links may be replaced soon*

## Prizes

In the iGEM competition there are medals and and track prizes to be conquered. There is also a range of special awards.

You can see these and the winners of 2021 here:

[https://jamboree.igem.org/results?](https://jamboree.igem.org/results?mtm_campaign=results&mtm_source=2021.igem.org&mtm_medium=counsel)

[mtm\\_campaign=results&mtm\\_source=2021.igem.org&mtm\\_medium=counsel](https://jamboree.igem.org/results?mtm_campaign=results&mtm_source=2021.igem.org&mtm_medium=counsel)

Depending on the team's strengths you may choose different aspects to focus on!

# IGEM UPPSALA

## iGEM Uppsala is divided in two entities

### The Board

It is an association for current and past iGEMers. The board has an important role in ensuring the continuation of iGEM Uppsala, including the process of starting a new team every year, by suggesting the project managers to the course leader. The board also maintains the Alumni network, transfers acquired knowledge between current and previous teams and acts as an administrative back-up, support for course leaders and many other things. The board is a unequivocal part of the success of iGEM in Uppsala.



### The Team

It is formed by the Uppsala University students (including exchange students if applicable) that are registered in the course (see below) and therefore part of the project planning, development and delivery. The team is organized in Laboratory groups and Sub-Groups and every student works in both a Lab-group and a Sub-group.

The Laboratory groups deal with the experimental practices of the project. Their structure is defined in the later stages of the final project selection. The lab groups are carefully put together to allow for both prerequisites in the participating students, i.e. experience in molecular biology research and goals of the project. In order to participate in wet-lab work, students have to be registered to a laboratory course. The Sub-groups are involved in fulfilling the non-wet-Lab requirements and do not have the requirement of being registered to the laboratory course. The Uppsala Team is traditionally organized in **5 subgroups**: Human-practices, Wiki, Modelling, Graphical Design and Sponsoring.

# SUB-GROUPS

There are several non-wet-lab aspects deliveries from iGEM Head-quarters: Human practices, Wiki, presentations in form of videos and poster, and modelling. These aspects are crucial for a competitive project and traditionally Uppsala teams are divided not only in lab-groups but also the following subgroups.

## Wiki

The web-page of every team is called "WIKI". Here is where all the information about the project will be submitted and where the judges will get the information to evaluate. It has given requirements but every team has to develop one themselves.

You can read more about this here: <https://2021.igem.org/Competition/Deliverables/Wiki>

## Human Practice

Human practice (HP) is usually divided into two categories, integrated-HP and Public engagement but also connects to achievements in entrepreneurship, contributions, presentations and more. Integrated HP aims to contact different sectors (e.g. diagnostics projects with a hospital) in order to get a clear view of the needs or do some research collaborations. Public engagement is more focused in divulgation of the project or synthetic biology in general (e.g. going to high-schools to give a talk about iGEM).

More info: [https://2021.igem.org/Human\\_Practices](https://2021.igem.org/Human_Practices)

## Modelling

Modelling aims to develop any sort of computer simulations supporting the wet-lab experiments. This could for example be modelling the biosynthetic expression pathway of a biological molecule or modelling the kinetics of a regulatory pathway.

## Graphical Design

Graphical Design is an important part of the presentation materials in iGEM. There are different posters, presentations, all the graphical content, which goes on the wiki, social media and more to be developed. Much of the work here is creative with a design and art component, ensuring to create original and eye-catching designs.

## Sponsoring/Marketing

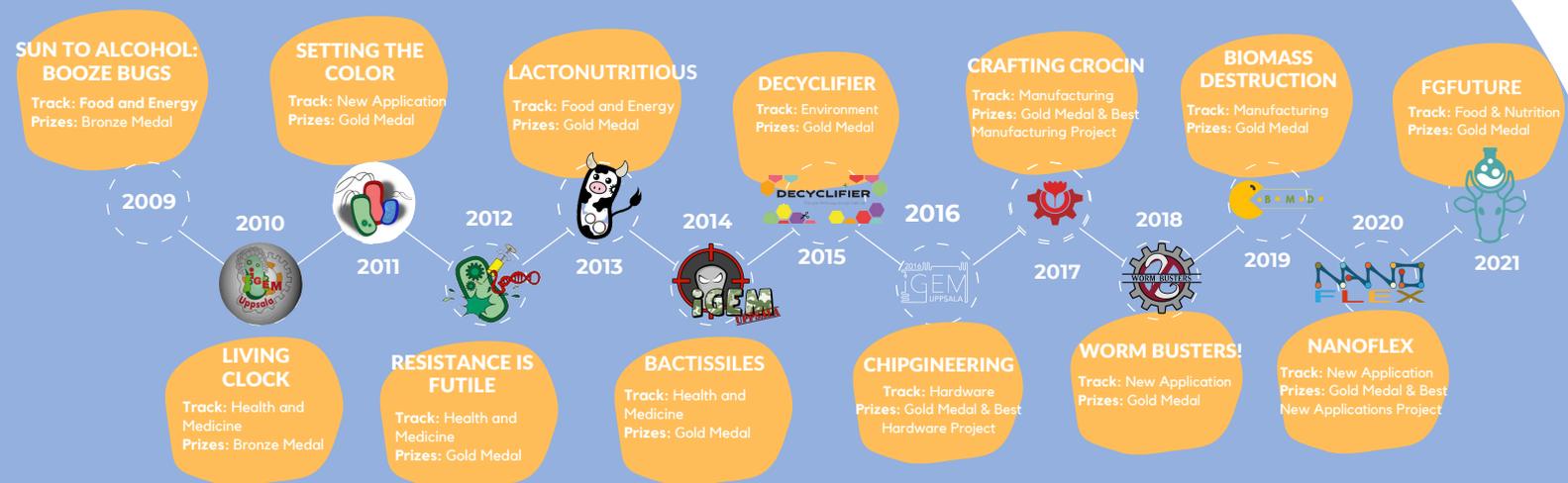
Sponsoring is a big and essential part of the iGEM project. Everything from ensuring monetary funds for team merchandise to lab kits and specific equipment which might be needed. Much of the work is focused on marketing the project effectively to be able to reach out to different companies and institutions interested in providing sponsorship.

# IGEM THROUGH THE AGES

Uppsala has joined iGEM 12 years in a row now, won **11 consecutive gold medals** and **3 track prizes**. iGEM projects are divided into different categories (e.g manufacturing, diagnostics, hardware, new applications etc) called tracks.

More on different competition categories and tracks:

<https://2021.igem.org/Judging/Introduction>



# UPPSALA TRACK PRIZES

## Chipengineering

The 2016 years' project centered around simplifying usage of two new exciting technologies: CRISPR/Cpf1 and microfluidics as well as characterising a new fluorescent eukaryotic protein UnaG. The team developed a method to make microfluidics more available to iGEM teams and researchers and managed to express and characterize the UnaG protein. The team also made several biobricks for expressing UnaG as well as Cpf1 and its associated genes

## Crafting Crocin

In 2017, iGEM Uppsala was **Crafting Crocin**. Crocin is an apocarotenoid (organic pigment) found in saffron, extracted from the flower *Crocus Sativus*. Crocin, crocetin, zeaxanthin and other pigments in the crocin pathway, are the compounds which gives saffron it's beautiful red color and delicious taste. The pathway compounds have great potential as organic dyes for industrial applications. On top of this, recent studies suggest that these colorful components have several medicinal properties. By using synthetic biology for recombinant expression in *Escherichia Coli* team aimed to reduce the price of the compounds within the crocin pathway and open up the possibility for industrial and medicinal applications to be further explored.

## NANOFLEX

By using exchangeable nanobodies fused to a DNA binding domain, team 2020 developed **NANOFLEX**. The biosensor is able to detect a target molecule and induce an output signal visible by the naked eye. A key part of the project is the modular approach; this allows the technology to be applied in a variety of situations ranging from environmental detection to drug detection. Furthermore, the 2020 team has laid the groundwork of a more efficient assembly, Type IIS iGEM standard, for the many genetic elements of **NANOFLEX**.

Read more on : <http://igemuppsala.se/project.php>

# ARE YOU AN IGEMER?

The student profiles that we are searching for are within the fields of biology, chemistry and IT. Here after there is a description of the skills that will be most likely used/developed during the project. It is important to remark two things, first, regarding the experimental part techniques used depend strongly on the project. Second, we don't expect you to know all of them, but we do expect you to want to learn/improve most of them.

## Basic laborative techniques for synbio

- Pipetting
- Plating
- PCR
- Transformation
- Cell culturing
- Spectroscopy
- Gel-electrophoresis
- SDS-page and more

## Web development

- HTML
- CSS
- JavaScript
- Web design
- Prototyping

## Graphical Design

- Logo
- Posters
- Presentations
- Videos
- Photos

## Independent Researching

Studying articles during deep-research period

## Communicating Science

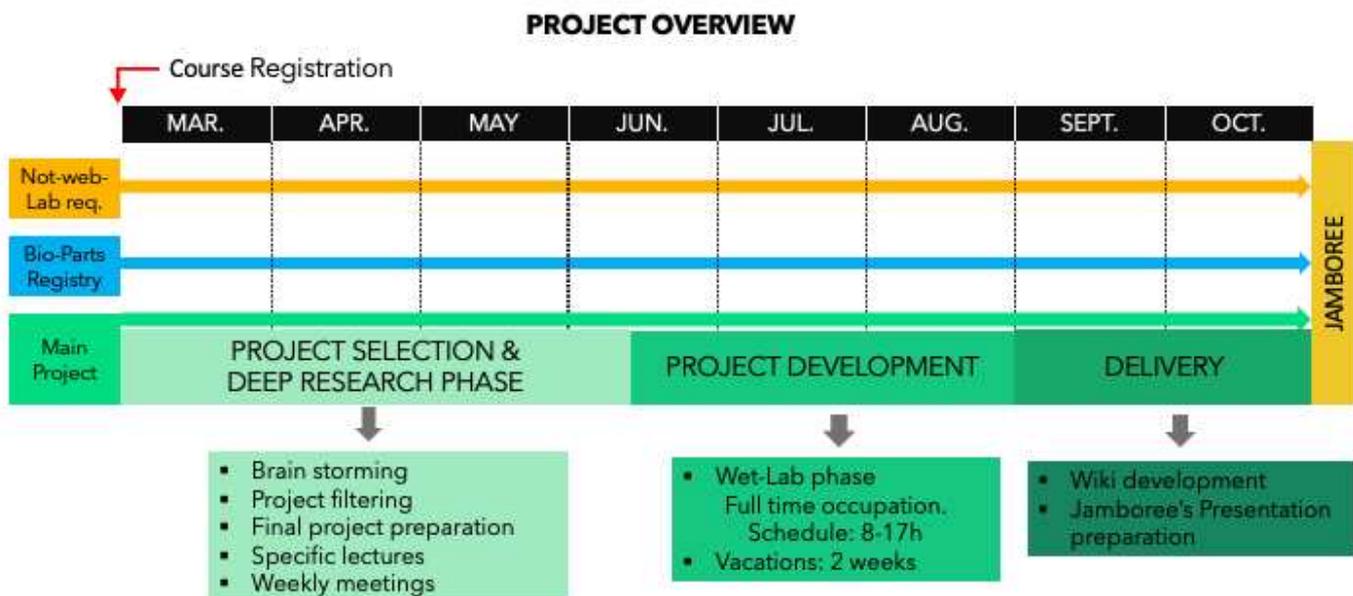
Presentations upon several occasions, reaching out to industry/general public/researchers

## Computational Biology and Bioinformatics

- Analyse collections of biological data
- Convert biological systems into a system of equations for predictive models in silico

# PROJECT TIMELINE

Each year the exact project time-line is different, depending on what the project is and how the project managers together with the course leader decide to structure it all. However, below you will find a general project line, which projects in Uppsala have traditionally followed.



## Winter/Spring

After some introductory workshops, we are ready to discuss and start researching different paths for projects. Early work includes brainstorming, research, project filtering and finishes with a final project selection. This is followed by deep research on the topic, planning of experimental work and other types of preparation. Lectures in relevant aspects and topics will be offered. Traditionally this is also the beginning phases of organizing subgroup work and starting with human practices, sponsoring and graphical design.

## SUMMER

Actual project development, which includes all the aspects explained above. Every Team member has the right of 2 weeks of vacation during this period.

## Autumn

Posters, wiki (web page) and presentation among others will be prepared for the competition.

## Vacations

To participate in an iGEM project can be intense, but during the summer period each student has the right of taking 2 well-deserved weeks of vacation, that can be taken at the same time or split through the months. To make the project proceed well throughout the summer, the vacation by individual team members has to be coordinated between the team members. After the team is registered the vacation dates for the members will be planned, taking into account personal preferences of each member.

# THE IGEM COURSE

The iGEM Project is integrated also into a course. All project participants must be active students of Uppsala University. Registration is mandatory for all participants who are going to work experimentally in the lab. If you would like to join the iGEM project but do not fulfil the formal prerequisites for the courses IMB205 or IMB405, please talk to us.

As seen above, the success of iGEM depends on multidisciplinary and the co-creation by students with different backgrounds and experiences. We will explore the possibilities of connecting students from different study programmes to the project if you let us know you are interested.

You can read more about this here:

<https://ibg.uu.se/education/courses-programmes/igem/>

## COURSE

- Laborative part of iGEM Project is integrated into a course. **Registration is mandatory** for all participants
- 15 hp
- Name of the course varies depending on the personal enrolled programme  
e.g. *Master students of Applied biotechnology - Project in Laboratory Synthetic Biology*  
Non-regular cases will be studied individually by our course coordinator

## FEE-PAYING STUDENTS

### 2 Alternatives

Registration assessed by course coordinator

- Pay for the extra credits
- Join only for non-laboratory project parts

# FOR MORE INFORMATION CONTACT US

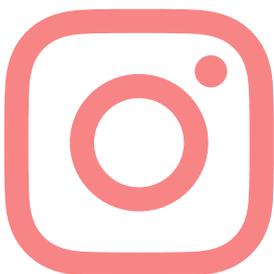
## IGEM UPPSALA BOARD:

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