

SYN BEE

D2.1 Page with shared
resources



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EXECUTIVE SUMMARY

The SYNBEE project aims to boost entrepreneurial education for academia in synthetic biology. On the one hand, interactive training will provide deep understanding of complex topics, and exceptional networking opportunity for the participants. On the other hand, it is important to consolidate a knowledge base with existing resources. This will allow the consortium to avoid proposing knowledge and skills already well covered by existing accessible training and/or other projects. This will also allow participants to acquire knowledge in a very flexible way (timewise and location-wise), and to save time searching for information in multiple dispersed resources.

The purpose of this document is to display resources (MOOCs, video webinars and interviews, articles) readily available either on the websites of the consortium partners or identified at other relevant sources. The list is being progressively consolidated, resources and tools classified.

We have identified three main groups of resources: (a) general entrepreneurial knowledge (core skills including business plan development, decks and pitching, finance, and marketing fundamentals: business modelling, business plan, IP, communication, etc.), useful in any company; (b) Synthetic biology-specific information; (c) IT, AI, digitalization resources.

All the information will be available on the project website in free access. Students will contribute to enrichment of this resource via preparation of short training videos, interviews with the industry. This will contribute to learning and networking process. All the content will be shared via project website in the section "KNOWLEDGE BASE", but also social media to disseminate knowledge and attract broader visibility to the project activities.



ABBREVIATIONS AND ACRONYMS

IP	Intellectual Property
MOOC	Massive Open Online Course
RTU	Riga Technical University
SynBio	Synthetic biology
TU Delft	Technical University Delft
TWB	Toulouse White Biotechnology



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INTRODUCTION

The SYNBEE project aims to boost entrepreneurial education for academia in synthetic biology. On the one hand, interactive training will provide deep understanding of complex topics, and exceptional networking opportunity for the participants. On the other hand, it is important to consolidate a knowledge base with existing resources (MOOCs, videos, articles, books, slideshows), to provide the community with flexible (anywhere, anytime) access to valuable knowledge about entrepreneurship and/or synthetic biology.

The work on this task is split into two subsections:

- This document provides a preliminary overview of the already identified resources, which are being classified, organized and reshaped by the designers to be put on the project website in the coming weeks.
- During the next project implementation stages, this knowledge base will be continuously complemented:
 - a) The consortium partners, with the support from the community, will identify other useful resources, which will be progressively added to the knowledge base.
 - b) The project trainees as part of their training will produce new knowledge (in the form of interviews, short training videos/vlogs, other support documents), which will be also added to the knowledge base.



1 THE KNOWLEDGE BASE CONSTITUTION

To constitute the **“D2.1 Page with shared resources”**, the SYN BEE consortium has consolidated a document in the SharePoint, where each partner could add relevant existing documents, information, other resources (Figure 1).

Figure 1: Database of shared resources in the project SharePoint

Partner	Type	Resource Link	Title	About the resource	About author(s) (optional)	Duration	Tag
MIT	MOOC	https://www.edx.org/course/principles-of-synthetic-biology	Principles of Synthetic Biology	Learn how to engineer biological systems and program organisms to perform novel tasks		150h	Synthetic biology
Biocatalyst	PDF	https://academic.oup.com/synbio/article/8/1/ysad009/7133777	Synthetic biology regulation in Europe: containment, release and beyond	Review of the EU synthetic biology regulatory landscape with several case studies			regulatory
Johns Hopkins University	MOOC	https://www.coursera.org/learn/synbioethics	Engineering Life: Synbio, Bioethics & Public Policy	Awareness and understanding of ethical and policy/governance issues that arise in the design, conduct and application of synthetic biology		13h	ethics
TWB	MOOC	https://openclassrooms.com/en/courses/7727016-introduction-to-emerging-technologies	Introduction to Emerging Technologies - Part 3. Analyze and Create Hypotheses for Synthetic Biology				
TU Delft	MOOC	https://online-learning.tudelft.nl/courses/entrepreneurship-for-engineers/	Entrepreneurship-for-engineers	The course is made up of modules that are presented by experts in the field of entrepreneurship and technology. Modules include: Team Building, Opportunity Recognition, Financing & Customer Acquisition	Victor Scholten is an assistant professor in Technology-Based Entrepreneurship, Faculty of Technology, Policy and Management at Delft University of Technology. Dap Hartmann is an associate professor of Innovation Management and Entrepreneurship, Faculty of Technology, Policy and Management, Delft University of Technology.	Effort: 2 - 3 hours per week / 8 weeks	Entrepreneurship
TU Delft	MOOC	https://online-learning.tudelft.nl/courses/big-data-strategies-to-transform-your-business/	Big Data Strategies to Transform Your Business	Make your organization's business strategy and model, as well as your own career path, future-proof by using big data's disruptive power.	Claudia Werker is an associate professor of Economics of Technology and Innovation at Delft University of Technology. Scott Cunningham is a professor of Urban Policy at the University of Strathclyde, England. Marijn Janssen is a professor at the section of Information and Communication Technology, Faculty of Technology, Policy and Management at Delft University of Technology.	Effort: 7 - 10 hours per week / 6 weeks	Strategy, Business, Data

After 6 weeks of brainstorming and consolidation of information, a preliminary list of selected resources has been consolidated, each document classified by origin, type of the resource (MOOC, PDF, Video), main focus (“synthetic biology”, “entrepreneurship”, “other”).

In parallel, designer team has started to integrate the future “Knowledge base” space into the sandbox of the SYN BEE website (Figure 2)

Figure 2: Website display. “Knowledge base” section



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The consortium has discussed during the bi-weekly meetings the preferred way how the resources could be displayed.

The first version of the “Knowledge base” page is expected to be released on the SYNBBE website by July 2023.

Through the project duration, the interactive training sessions will be (when possible) recorded and progressively shared on the knowledge base page. SYNBBE trainees will be proposed an opportunity to create educational content too. It will be also exposed on the project website.

2 THE KNOWLEDGE BASE CONTENT EXAMPLES

2.1 SYNTHETIC BIOLOGY AXIS

The SYNBBE consortium has extensive knowledge of the synthetic biology field. The consortium partners regularly publish articles in peer reviewed journals, prepare market reports, they also either organise MOOCs themselves, or participate to courses, webinars, interviews, organised by other institutions. They will progressively constitute a knowledge base with diverse types of information about the subject. The table 1 shows an example of information which will be shared in the knowledge base about the synthetic biology.

Table 1 SYNBBE knowledge base: “Synthetic Biology” axes

Resource	Type	Title	Short description
MIT	MOOC	Principles of Synthetic Biology	Learn how to engineer biological systems and program organisms to perform novel tasks
Biocatalyst	PDF	Synthetic biology regulation in Europe: containment, release and beyond	Review of the EU synthetic biology regulatory landscape with several case studies
Johns Hopkins University	MOOC	Engineering Life: Synbio, Bioethics & Public Policy	Awareness and understanding of ethical and policy/ governance issues that arise in the design, conduct and application of synthetic biology



TWB	MOOC	Introduction to Emerging Technologies - Part 3. Analyze and Create Hypotheses for Synthetic Biology	Identification of opportunities for innovation by value chain mapping. Establishing a frame of analysis to examine technologies. Developing hypotheses to implement emerging technologies, with a specific focus on synthetic biology
University of Manchester	MOOC	Industrial Biotechnology	Key enabling technologies that underpin biotechnology research including enzyme discovery and engineering, systems and synthetic biology and biochemical and process engineering.
McKinsey Global Institute	PDF	The Bio Revolution: Innovation transforming economies, societies, and our lives	A broad market report covering diverse aspects of the synthetic biology impact on the global markets.
SynBioBeta	PDF	Synthetic Biology Venture Investment Reports	Synthetic biology market trends, figures, accomplishments, news
Icahn School of Medicine at Mount Sinai	MOOC	Systems biology and Biotechnology	Expertise for Professionals and Students in Biotechnology and Biomedical Data Sciences. Learn Methodologies in Systems Biology Including: Bioinformatics, Dynamical Modeling, Genomics, Network and Statistical Modeling, Proteomics, Omics Technologies Single Cell Research Technologies
Technical University of Denmark	MOOC	Introduction to Industrial Bioprocess Development	Bioprocesses make use of microorganisms, animal cells, or enzymes to manufacture new products or complete a chemical transformation. Bioprocesses have been developed for an enormous range of commercial products, from relatively cheap products such as organic solvents and industrial alcohol, to expensive specialty chemicals such as therapeutic proteins, antibiotics, and vaccines. Nowadays, the development of bioprocesses is an essential part of a large number of chemical, food, and pharmaceutical industries. The main purpose of the course is to provide an



			overview of the common stages involved in this type of processes
iGEM	Webinars	iGEM webinars	iGEM proposes 27 webinars covering diverse topics related to synthetic biology: High-Throughput Solutions for DNA Assembly, DNA Assembly Strategies, Basic Molecular Biology/Designing DNA sequences, etc.

2.2 ENTREPRENEURSHIP

The SYNBEE consortium partners are deeply involved in entrepreneurial activities in Europe in general, and particularly in synthetic biology entrepreneurship. Some of the project partners (TU Delft, TWB, RTU) play a key role in entrepreneurial education of synthetic biology students/startups in their respective regions. The consortium decided to share and amplify these resources. The table 2 shows an example of knowledge which will be shared in the knowledge base about the entrepreneurial aspects with respect to synthetic biology.

Table 2 SYNBEE knowledge base: "Entrepreneurship in Synthetic Biology" axes

Resource	Type	Title	Short description
TU Delft	MOOC	Entrepreneurship-for-engineers	The course is made up of modules that are presented by experts in the field of entrepreneurship and technology. Modules include: Team Building, Opportunity Recognition, Financing & Customer Acquisition
TU Delft	MOOC	Project Finance: Funding Projects Successfully	Learn the key strategies used by project managers to generate crucial funding for their projects.
TU Delft	MOOC	Project Management: Mastering Complexity	Develop the project management skills you need to handle complexity in engineering, infrastructure, and other large projects.
TU Delft	MOOC	Project Management of Engineering Projects: Preparing for Success	Create your own project plan and learn the importance of the early project phases in achieving project success. People are key!



TU Delft	MOOC	The Value of Business Models	Learn the value of business models and essential tools to help you develop a sound business model for sustainable success
TU Delft	MOOC	How to Design a Successful Business Model	Learn how to create value for your customers and grow your business by designing a successful and sustainable business model.
TU Delft	MOOC	Business Model Testing	Learn how to stress test your business model to help you anticipate change and harness your business model's success.
TU Delft	MOOC	Business Model Implementation	Learn how to successfully implement a new business model by creating a practical action plan and roadmap.
TU Delft	MOOC	Design Practice in Business: Spark Innovation Like a Designer	Learn the essentials of design practice for developing new business opportunities and sparking innovation.
TU Delft	Lectures & Readings	Effective Decision Making: Dealing with Business Complexity	What you will learn: How to analyze a business scenario and strategy using a systematic approach to successfully deal with complex decision situations How to use an analytical approach in business and analyze stakeholders, goals, and multi-criteria for a business strategy. How to formulate a sound business strategy by applying a set of practical analytical techniques to support business planning and strategic decision making. How to employ an analytical mindset through writing a managerial summary of a business situation analysis that helps your organization move in the desired direction
University of Maryland	Online Course	Intellectual Property for Entrepreneurs	What you will learn: Understand intellectual property and how it impacts the success of entrepreneurs and companies. Learn what is patentable and how to secure a patent. Know how copyrights and trademarks are created and managed. Appreciate the role that trade secrets play in companies.



Bocconi	MOOC	Private equity and venture capital	Deep understanding of the mechanism underpinning the creation and/or development of a firm and the financial support it can get from the financial system through venture capital investment
ie	MOOC	Scaling Product and Processes	Product-market fit, sales, and marketing. Discover what sets your product apart - and how to capitalize on what your company has to offer as you scale up your startup. In this course, you will learn how to rethink your product to make sure it is scalable; understand the importance and elements of a growth

2.3 OTHER RELEVANT SKILLS

The synthetic biology entrepreneurship training would not be complete without other relevant knowledge, to be taken into consideration when working in a synthetic biology R&D and innovation. We would like to specifically bring the students'/community attention, increase awareness, stress the importance of data, artificial intelligence, and other digitalization-related aspects, ethics, safety, and regulatory aspects, as well as more transversal skills, such as management, leadership, problem solving, gender, etc. The table 3 shows an example of courses which will be shared in the base to provide other relevant and useful knowledge.

Table 3 SYNBBE knowledge base: "Other relevant skills" axes

Resource	Type	Title	Short description
TU Delft	MOOC	Big Data Strategies to Transform Your Business	Make your organization's business strategy and model, as well as your own career path, future-proof by using big data's disruptive power.
TU Delft	MOOC	Responsible Innovation: Ethics, Safety and Technology	How to deal with risks and ethical questions raised by development of new technologies.



TU Delft	Lectures & Readings	Communicating Effectively: How to Inspire and Convince	What you will learn: How to derive a concise message from a complex situation How to use framing and reframing effectively to achieve your goals. How to gain support from senior management and your teams. Develop and apply a sensemaking mindset.
TU Delft	Lectures & Readings	Creative Problem Solving and Decision making	What you will learn: Analytically based support of decision-making, design, and implementation of solutions. How to apply tools like actor analysis, causal modeling, goal trees and means-end diagrams, problem diagrams, uncertainty, decision support and score cards.
TU Delft	Lectures & Readings	Influencing Stakeholders: Dealing with Power and Dynamics in Teams and Networks	What you will learn: How to encourage multiple stakeholders with different interests to cooperate. How to recognize team dynamics, define roles and norms, and handle both individual and team issues, including motivating group members. The tacit 'rules of the game' of interacting in a complex world. How to develop and apply an influencing mindset to create a strategic plan
Rotterdam School of Management at Erasmus University (RSM)	MOOC	Driving business towards the Sustainable Development Goals	Role of businesses in achieving the SDGs. You will gain insights from leaders of international companies and academics in business and management who will guide you through the issue of how businesses can contribute to the SDGs
iGEM	Webinars	iGEM webinars	iGEM proposes webinars, covering multiple transversal topics, treated by experts in synthetic biology. Some examples are "Lab automation", "Communicating your project", "Making GitHub work for you", "Bioinformatics - Computational Approaches to Analyze Sequences"

