

Teaching portfolio

1. Teaching CV: A list of any lecturing and supervision tasks, including specification of academic fields, scope, level (bachelor, master, continuing education, PhD) as well as any external examiner tasks.

- Organizer and coordinator of the first AAU Engineering PhD Summer School 2022 course on Plastic Biorefinery and Upcycling
- Coordinator of the 2-days AAU PBL workshop for the ITACA project
- Steering committee for the creation of a new 3rd cycle Advanced Training Center for environmental remediation in Azerbaijan (ITACA project)
- Supervisor for the PhD Candidate Passanun Lomwongsopon (2022-2024)
- Main supervisor for the PhD candidate Clara Fernando Foncillas (2019-2021)
- Semester coordinator for 6th semester bachelor in 2021
- Semester coordinator for 8th semester in 2021 and 2022
- In 2021 I have contributed with lectures in several courses, including:
 - +Advanced Microbial Production (7th semester),
 - +Applied Biodiversity (3rd semester),
 - +Biological Production Processes (7th semester),
 - +Biorefinery Principles (7th semester),
 - +Cases in Bioprocess Technology (6th semester),
 - +Microbial Discovery (4th semester),
 - +Microbiological Processes (4th semester),
 - +Process Technology (4th semester),
 - +Energy and Resources (5th semester),
 - +Biomass Conversion Processes (8th semester),
 - +Microbial Discovery (8th semester),
 - +Anaerobic and Fungal Technology (8th semester),
 - +Emerging and Cutting Edge Technology (7th semester Techno-anthropology).
- PhD Evaluation Committee for the doctoral dissertation of OKONKWO Onyinye at the University of Paris-Est (Champs-sur-Marne, 12/12/2019). Thesis title: Enhancement of thermophilic dark fermentative hydrogen production and the use of molecular biology methods for bioprocess monitoring.
The study was conducted within the framework of the Marie Skłodowska-Curie Eu-ropean Joint Doctorate (EJD) in Advanced Biological Waste to Energy Technologies (ABWET), in collaboration among several institutions.
- European Expert for the evaluation of H2020 Marie Curie proposals
- In the last 3 years I have supervised 73 student projects, with more than 20 Master and Bachelor Thesis.

Experiences from previous years:

- Supervisor for the 2nd semester bachelor Semester project (15 ECTS) "Biomass Conversion" (2 groups with 10 students in total) dealing with Biomass conversion of sugar beet leaves and Accessible Sugars from *Zostera marina* after hydrothermal Pretreatment- Lecturer in the 5 ECTS course "Microbiological Discovery" (MSc, 8th semester): 2 lectures (Introduction to Microbial Ecology and Microbiological Ecosystems)
- Lecturer in the 8th Semester MSc project course (15 ECTS) "Biomass conversion design" (Mass Balance Principles)- Supervisor for the 8th semester MSc Semester project "Biomass conversion design" (2 group of 8 students in total, working with production of succinic acid from glycerol by *Yarrowia lipolitica* and microalgae biorefin-ery for biodiesel and DHA production)
- Supervisor of a bachelor thesis projects (BSc, 6th semester) dealing with glycerol fermentation for the pro-duction of hydrogen, ethanol and 1,3 propanediol (2 students)
- Lecturer in PhD Summer school on Anaerobic Biotechnology (Exploring microbial diversity for Biorefineries using mixed cultures)
- Examiner for the 8th semester MS course "Advanced Kinetic Modelling (4 groups)
- Chairman of the evaluation committee for the PhD Defence of Maria Santamaria (A NOVEL GREEN BIOREFINERY CONCEPT
- Semester coordinator for 7th semester MSc
- Lecturer in the 5 ECTS course Biological Production Process (MSc, 7th semester): 3 lectures (Bioreactor Design 1, Bioreactor Design 2, and Stoichiometry of microbiological reactions)
- Course responsible for the 5 ECTS course Applied Biodiversity (BSc, 3rd semester): 3 lectures (Gram + Bacteria you should know, Gram – bacteria you should know, and Microbial interactions)
- Lecturer in the 5 ECTS course Biorefinery Principles (MSc, 7th semester): 1 lecture (The oil and glycerol biorefinery)- Supervisor for the 7th semester MSc Semester project (15 ECTS) "Advance Microbiological Production"(3 groups with 13 students in total, working with ENHANCING LACTIC ACID PRODUCTION FROM GREEN BIOMASS FRACTIONS and INTERMEDIATE ACID PRODUCTION FROM COMBINING DAIRY WASTE WATER AND SOURCE SORTED FRACTION OF MUNICIPAL SOLID WASTE)

- Supervisor and co-supervisor of 4 Master Thesis projects (5 students) dealing with degradation of pesticides, microbial degradation of LDPE plastics, engineering of *Ideonella sakaiensis* for the degradation of PET, and overexpression of sugar production in *Cyanobacteria*) Other experiences:
- +Mentor of a team project for Master students, participating in the iGEM "Green Challenge" competition 2016: "Substrate and Product subgroup": DTU Biobuilders (for the valorization of waste streams using *Yarrowia Lipolytica*. DTU Institute for Biotechnology and Biomedicine. Responsible: Professor Christopher Workman.
- +Supervision of a lab technician trainee for the development and optimization of a rapid HPLC method for the joint detection of sugars, alcohols and VFAs, by coupling RI and PDA detector. Scope was the development of a rapid method for the monitoring of fermentation broths. 2016. DTU BioEng.
- +Evaluation committee of M.Sc. Thesis (Biochemical Engineering) of the University of Valparaiso (PUCV), Chile. Title: "Improvement of the hydrogen yield in a continuous dark fermentation process with glycerol as substrate by manipulation of operational parameters". Candidate: Fernando Silva Il-lanes; Advisor: Prof Gonzalo Ruiz Filippi. Sept. 2015
- +Co-Supervisor for Bachelor Thesis: "Adaptation of a mixed culture for butyrate production"; Scope was to enrich and adapt a mixed culture obtained from anaerobic sludge to grow on a highly inhibiting animal-fat derived crude glycerol. 2014 Section for Sustainable Biotechnology, AAU.
- +Co-Supervisor for Master Thesis: "Fermentation of crude glycerol by mixed microbial consortia: monitoring products and development of the microbial consortium in a CSTR". Scope was to develop a stable continuous fermentation process to convert crude glycerol into VFAs in non-sterile conditions. 2014 Section for Sustainable Biotechnology, AAU.
- +Co-Supervisor of Master Thesis: "Analysis of innovative technologies for the valorization of crude glycerol". Scope was to make a comprehensive study and techno-economic analysis of new processes available to convert glycerol, comparing thermo-chemical and biological technologies. 2013-2014 University Sapienza of Rome, Department of Chemical Engineering DICMA
- +Co-Supervisor of Master Thesis: "Innovative technologies for the Anaerobic Digestion of agro-industrial and zootechnical waste". Scope was to make a comprehensive study and techno-economic analysis of new technologies available to convert different waste streams into biogas. 2013-2014 University Sapienza of Rome, Department of Chemical Engineering DICMA.
- +Lecturer for the Post-graduate (holding M.Sc. in Biotechnology or Biology) training courses of the Italian Confederation of Agriculture (CIA) for the management of agro-energetic AD plants. Scope of the course was to provide practical insight and examples of AD technologies to young professionals who are going to work with AD plants (03-04/2013):-Varrone C. Methanation tests in practice. CIA
- Umbria, Perugia (Italy).-Varrone C. Optimization of inocula and process parameters. CIA, Perugia (Italy).
- Varrone C. Research and innovation in the field of Anaerobic Digestion. CIA, Perugia (Italy)
- Varrone C. Management and valorisation of manure and digestate; CIA, Perugia (Italy).
- +Supervision of international staff exchange programme between Italy and China (2013-2015), including PhD students and researchers from the Italian and Chinese research institutions. Project: Op-timized bioconversion of crude glycerol into hydrogen and ethanol using Geo-Chip and coupling with MEC.
- +Supervisor of a PhD student: training for HPLC analysis and instrument maintenance, statistical optimization of substrate composition (co-fermentation of different waste streams) for hydrogen production, elaboration of data and preparation of a paper (published in IJHE) and a successful Marie Curie IEF application (together with INRA Narbonne) for the coupling of fermentation broth with MFC/MEC, applying an eco-biotechnological approach; 2013 University Tuscia (Viterbo), Faculty of Biology; in collaboration with the Laboratory of ENEA-Casaccia Research Centre, Rome (Italy).
- +Lecture about "Glycerol Biorefineries" targeting master and PhD students, at the University of Val-paraiso PUCV. Scope of the lecture was to provide insight about the state of the art and bottlenecks of the glycerol valorization technologies, in the view of a collaboration in an EU project. 2013. Chile
- +Co-Supervisor of Master Thesis: "Analysis and characterization of a microbial consortium selected for the conversion of crude glycerol into hydrogen and ethanol". Scope of the thesis was to character-ize an adapted functional consortium, isolating the key species to test their individual and joint contri-bution to the process. 2012-2013 University Sapienza of Rome, Faculty of Biology.
- +Lecturer for the Advanced Training Programme in "Environmental Management and Sustainable Development" focus on Renewable Energy and Energy Efficiency (targeting Officials of the Chinese Academy of Sciences), organized by the Italian Ministry for the Environment and the Venice Interna-tional University (VIU). Scope of the porgramme was to strengthen collaboration as well as facilitate technology transfer and application best practices with China.
- Varrone C. Biological hydrogen production as a promising source of renewable energy. 2010. ENEA-Casaccia Research Centre, Rome (Italy).
- Varrone C. Italian Projects for Renewable Energy. 2011, IMELS, Rome (Italy).
- Varrone C. Innovations in the Energy Sector. 2012, Venice, Italy.(http://sdcommunity.org/cb-mandatory/userprofile/varrone_cristiano)
- +Lab training for master and PhD students, dealing with best practice for characterization of organic matter and its conversion into gaseous and liquid metabolites. Scope of the training was to increase the awareness about lab safety and risks of improper use of chemicals and lab equipment. 2009-2011. Harbin Institute of Technology. China.

2. Study administration: A list of any study administration tasks, e.g. study board membership, head of studies or semester or course coordinator, accreditation, etc.

VI semester coordinator for bachelor thesis in Spring 2018; VII semester coordinator in Fall 2018; chairman of PhD Assessment Committee; Evaluation committee for 4 assistant professor positions at RUC; VII semester coordinator in Autumn 2018, HSE representative; EU Expert Evaluator for Marie Curie IF Call 2018.

In Autumn 2018, I was also appointed Health, Safety and Environment (HSE) representative, being in charge of the lab safety of all researchers and students. This activity involves the approval of all risk assessments (required by all groups before entering the lab) in each semester, the update of our HSE Manual, as well as the setting up of the online exam and evaluation at the beginning of each semester. This requires to participate to the yearly safety meeting of the department (Årlig arbejdsmiljødrøftelse samt Møde i Arbejdsmiljøudvalg) where we report eventual problems related to the working environment, incidents, things to improve, etc. and the approval of the minutes. The activity also requires the participation in a course on safety, approved by the Danish Working Environment Authority. Based on this course, I created a document on how to improve the safety in our lab, which was delivered to the Section Leader.

3. University pedagogy qualifications: A list of any completed courses in university pedagogy, PBL courses, workshops, academic development projects, collegial guidance and supervision, etc.

Besides the courses offered in my adjunkt pædagogikum (i.e. about the AAU PBL method, introduction, Project examination and evaluation, etc.), I have also followed AAU seminars for pedagogical competence development (i.e. workshop on E-learning and Flipped Classes) offered by AAU.

Certification for Lecturers in English as the Medium of Instruction: Professional use of English as a "lingua franca" for teaching in international universities. Level C1 of the Common European Framework of Reference for Languages (CEFR)

Evaluation statement of the Adjunkt Pædagogikum

4. Other qualifications: Conference attendance, editorials, presentations, etc. relating to education, 'University Teaching Day', etc.

I followed the University Teaching Day at AAU-Cph in Spring 2018, with a focus on PBL, constructive failure and the use of visual tool in teaching.

5. Teaching activity development and teaching materials: A list of any contributions to the development of new modules, teaching materials, study programmes, e-learning, collaboration with external business partners, etc.

- Collaboration with KU in the frame of 1 master thesis in 2019 on biocontrol and biological crop protection
- Collaboration with KU in the frame of 2 master thesis in 2018 on engineering of Cyanobacteria
- Collaboration with SINTEF Trondheim EU BRISK project for mobility of researchers that allowed our Master student Alba I Quer to spend 1 month at SINTEF for her master thesis. The project covered 12000 dkk for her travel expenses and then bench fees and research costs at SINTEF in Trondheim (including high through put screening, DNA sequencing and all consumables)
- FMC agreement for Master thesis: the chemical company FMC supported our lab with 15000 dkk in the form of materials for HPLC consumables to quantify the biodegradation of their pesticides
- Agreement with University of Bruxelles: covered 1 month of stay (bench fees and consumables) of our master student Samantha Jenkins) and paid the conference fees to the 5th Edition of The International Conferences Green Chemistry - White Biotechnology on (BIO-)Polymers and Ecocircularity: From Challenges to Opportunities; Bruxelles. 8-9 May 2019.

6. Teaching awards you may have received or been nominated for.

Type your answer here...

7. Personal reflections and initiatives: Here you may state any personal deliberations as regards teaching and supervision, any wishes and plans for further pedagogic development, plans for following up on feedback/evaluations from students, etc.

Teaching in the field of Sustainable Biotechnology, I consider Research-based teaching as central. Even though I would assume this to be important for most (all?) PBL courses, I think it is particularly relevant for Engineering educations as ours. Providing real technological case studies, challenges, examples from companies and ongoing research projects, while stimulating the students to obtain a proper problem formulation (and identify new approaches to overcome the bottlenecks) is an essential integration to the theory. Personally, I consider "curiosity-driven research" and student-led initiatives as a particularly significant to obtain students' commitment and high motivation. A good example for this is given by 7th semester projects, in which the students showed their special interest on the topic "plastic pollution" and pesticide degradation, asking to work on these topics for their semester project. These were a completely new topics never explored before at our section, but I decided to support the student's interest and together we started to develop these projects. In my function as supervisor, I tried to "translate" their curiosity and interest into a feasible research project (considering our lab equipment and time constraints) and even though the initial results were modest, the students were thrilled to be able to develop their own ideas, and asked to continue with the project also in the 8th semester, and finally also for their Master

Thesis. To further support and stimulate the students, I involved a chemical company that produces pesticides and invited a researcher from the university of Bruxelles to give us a presentation about enzymatic degradation of plastics. To valorize the students' hard work (who had continued working on the project even after passing the exams), I asked for a separate meeting, so that the students could present their study to the researcher, and have a discussion with him. This laid the basis for an international collaboration, which allowed one of our students to visit Bruxelles during the master thesis. Another master student is doing his Master in collaboration with the chemical company now, while we also applied for a small EU fund to support the trip of a third master student to visit SINTEF in Norway, for a collaboration. By now we have 5 students working on the plastic degradation and 6 working on the pesticide degradation (involving both, Master and Bachelor thesis), and I am the coordinator for an EU H2020 proposal on the topic, to provide financial support to further develop this research. The most important part is the commitment and passion the students have put into this work, which allowed them to do much more than what would be necessary for a master, getting a deeper knowledge of the topic, and starting to contribute to the advancement of the state of the art. More in general, I think that my teaching philosophy is that, beyond the standard requirements and learning goals that need to be reached by each student, my goal as an educator is to stimulate our students to be curious, to "learn how to learn" and apply their knowledge, but most of all to give their best in what they are doing. Each person has her/his personal interests, predispositions, and strengths. My wish is to stimulate everyone to reach their personal best, based on their capabilities, underlining the importance of helping each other to reach those goals, for instance through team work activities. I believe this is in good agreement with the PBL approach for knowledge management, which focuses on the promotion of cognitive competences and the relevance of learning from and through experience. For these reasons, I find the Aalborg method very interesting and close to my personal experience and teaching style, since it is very applied and favors the development of important complementary skills such as problem solving and team working, in which everybody contributes to his/her best. In fact, in a team each member can contribute to the successful development of a project, based on their own capabilities and talents. I consider this a very good exercise because it also shows the students that together they can provide results that would not always be easily obtained when working alone (or sometimes could even be out of reach). Some bad examples from my teaching practice (especially in my first year, in 2017), which I am trying to focus on and improve, is my tendency to provide too much information and/or to solve the students problems, for instance by answering directly their questions. At the beginning, I found it quite challenging not to reply right away to a question (it was almost instinctive), but with time I am realizing that providing only some key elements to build upon can stimulate the students' analysis ability and eventually allow them to get to the right answer independently. Initially, I was also convinced that I would facilitate the students' work and understanding by providing all the possible information required to really grasp and master a certain topic. Thanks to some more experience, as well as the additional information coming from the adjunktpædagogikum courses, however, I come to understand that this can easily lead to information overload and cognitive noise, thus being counterproductive. For this reason, I have started to plan and structure my classes differently, using different tools (i.e. pre-assignments, quizzes, group work to solve complex problems, etc.), which are discussed in my reflection paper 2 of my adjunktpædagogikum final report.

8. Any other information or comments.

As a former Executive Board Member and Research Director of the NGO "Network of Early-Career Sustainable Scientists & Engineers" (<http://www.sustainablescientists.org/cristiano-varrone/>), I was developing several activities, such as:

- Promote networking and collaboration between early-career scientists (through the organization of science cafes and social events between NESSE's local groups in UK, US and Canada)
- Support NESSE's organization of courses, workshops, conferences, etc.
- Provide interdisciplinary knowledge focused on sustainable science and engineering by supporting NESSE's webinar series, suggesting relevant topics, inviting speakers, etc (with dedicated webinars, in collaboration with other NGO's such as Beyond Benign and Engineers for a Sustainable World, but also the ACS GCI, and the Green Chemistry & Commerce Council-GC3)
- Raise awareness about sustainability in research and current policies (through specific workshops i.e. "Building a BioEconomy for Europe" organized together with the GreenStems, NNFCC the Bioeconomy Consultant and the international conference Renewable Resources and Biorefineries RRB-11, June 2015, or the workshop "Science for Sustainable Development: Early-career Leaders" organized together with the Royal Society of Chemistry, British Council and UK Collaborative on Development Sciences, with the participation of Guido Schmidt-Traub, Executive Director of the UN Sustainable Development Solutions Network, December 2016)
- Engage early career researchers, and promote their visibility (for example through pitch talk courses, NESSE's podcasts for young researchers and dedicated webinars: "Engaging the Community Through Student Led Initiatives" <https://www.youtube.com/watch?v=CKjZK6cawnY>)
- Identify important Research Themes to be discussed in the website, provide blog posts, etc : (<https://www.linkedin.com/in/cristiano-varrone/recent-activity/posts/>);
- Develop and coordinate NESSE's Global Challenges Team for the preparation of articles and creation of a new dedicated section in NESSE's website (<http://www.sustainablescientists.org/what-is-the-difference-between-global-challenges-and-sustainable-development-goals/> ; <http://www.sustainablescientists.org/a-draft-framework-for-understanding-sustainable-development-goal-sdg-interactions/>);
- Keep updated NESSE's LinkedIn group with news in R&D, career opportunities, etc (<https://www.linkedin.com/groups/8109053>)

Other External Board Activities: Member of Scientific Advisory Board of GRAIL - EU FP7 Cooperation KBBE project (with the goal to review the progress of the project and support the dissemination of project results having a complimentary benefit to the standard dissemination tools. The board may also advise the Executive Board in issues concerning changes in societal and consumer priorities which may affect the project objectives and expected impacts, and on potential stakeholder concerns about project methodologies and deliverables) Member of the Quality Assurance Committee of GRAIL (with the goal verify and approve all the deliverables of the project before submitting them to the EU project officer).