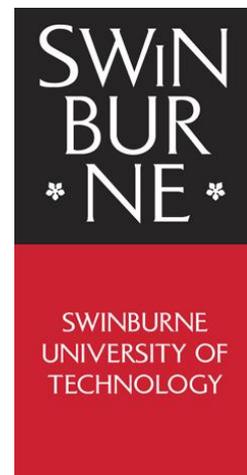


Transcript



Title: Swinburne International Webinar Series: Science and Biotechnology

Authors: Venus Liao, Mrinal Bhawe, Enzo Palombo, Mahdi Shariatian

Year: 2020

Audio/video for this transcript available from: <http://commons.swinburne.edu.au>

Venus Liao

Good afternoon and good morning, depending on where you're joining us today. Welcome to Swinburne Webinar Series. My name is Venus Liao. I'm the regional recruitment manager from Swinburne University. I'm responsible for onshore international student recruitment based in Melbourne, Australia. I hope you're all doing well and staying healthy.

Thank you for joining us today for virtual training on Swinburne Science and Biotechnology. This is part of the Swinburne Webinar Series I'm running from the month of May to July. We are in the second last session. On your right hand side are the panelists for today's webinar-- Professor Mrinal Bhawe and Professor Enzo Palombo, and Mahdi, the International Recruitment Manager from the Faculty of Science Engineering and Technology at Swinburne University.

Professor Mrinal will be giving an overview of information about the course structure for Master of Science (Biotechnology) in the first part of the presentation. And then Professor Enzo will join the second part of the presentation to talk about the research opportunity and case studies in the biotechnology field.

If you have any questions during the presentation, please leave your questions in the Q&A box at the bottom of the screen. At the end of this webinar, we will go through your questions together. If we can't answer your questions today, please feel free to contact Mahdi or your regional recruitment managers at Swinburne University. Without further ado, I'd like to introduce today's first presenter Professor Mrinal Bhawe, Course Director for Chemistry and Biotechnology at Swinburne University. Thank you, Mrinal.

Mrinal Bhawe

Hi, everybody. I hope this is a convenient time for you and I'm really grateful that you could join our session, the webinar on the Master of Science (Biotechnology) course. And I'm delighted to be sharing as much information as I can with you. This course is one of the strongest courses in our faculty. It has been going for more than 15 years, and we have had students from all over the world. And I've just made a little quick list of countries that we've had students from. We've had students from Spain and Venezuela and USA and African countries like Ghana and Libya and Sweden from Europe, of course, and Sri Lanka, India, Pakistan, Bangladesh, Vietnam, Bhutan, Malaysia, Indonesia,

Saudi Arabia, Iran, Iraq, the list goes on. So I'm really proud to say that we provide a really truly international course. And the students come here and enjoy and course structure has been set up in such a way that they end up sharing many classes with the local students. They get exposure to the local culture as well. So in addition to the actual science, we try to provide as much of an international exposure and international experience for them.

So in relation to the actual course itself, biotechnology is a field that combines biochemistry and molecular biology and microbiology and genetics and many different kinds of chemistry as well. And it distinguishes the fundamental sciences in the sense that biotechnology focuses on applications. So can we make use of cell cultures? Can we make use of plant cells? Can we make use of bacterial cells? Fungal cells? So to make all kinds of new products, can we make new lines of plants which will give us better food or more food? Can we save the planet by trying to minimise the contamination? Can we get rid of the contaminants that have accumulated? Can we make better food products?

So biotechnology is related to applying living organisms for basically the betterment of life for humans, as well as looking after the planet. So that is why we have a combination of many different sciences there, which are molecular biology and microbiology and biochemistry and so on. So if Mahdi can take me to the next slide, please.

So we have a combination of subjects. We classify the subjects as core units and elective units. The core units focus on exactly the area that I just mentioned, which is biochemistry, microbiology, molecular, and even we try to introduce nanotechnology in some of the project subjects. In addition to that, we provide eight or nine different kinds of electives and students take about four or five of them.

And those electives can be used by students in many different ways. For example, if a student is very interested in having for themselves an informal minor in microbiology, they could take a couple of electives in the microbiology area. Or if they're interested in the environmental sciences, they can pick electives in that area. If they're more interested in molecular sciences, they take the bioinformatics.

And then together with the core subjects in those areas, we also try to combine the focus of the research projects. So a student can end up with their own experience of conducting, planning a small or a large research project. And they become independent investigators. Because eventually they will end up being an employee. And they would want to know how to go about their everyday job, how to plan for it, how to carry out the job. So we provide the fundamental knowledge. We provide the applications of it. And we also provide guidance as to how a person can work independently in their own employment situation or further studies.

Mahdi, you can go to the next slide, please. So the Master of Science course is a two year course. The fourth year has got an exit point which is a graduate diploma. And at that level, the students will cover six core units and two elective units. And the core units will come from biotechnology sciences, molecular biology which is the genes and proteins, as well as the microbiology units and a unit called Research Methods which can be applied to any kind of science. And it shows the students how to carry out research systematically, carry out the critical analysis of the information. And at this level, students are also given a bit of experience on carrying out a small research project.

Then in the second year of the course, we give the students even more choices. So the second year has got more advanced units. And that is two units per semester and opportunities to take up two electives per semester, or they can do a major research project which is a 25 grade point unit. And that, again, allows the student to explore a particular area of their interest, be it in microbiology or nanotechnology or chemistry or many other research areas that we will focus on. And Enzo will explain the research areas actually meant for you. Mahdi, the next slide.

So while we're trying to teach the students all of these many different very important aspects of the field, that also allows them the opportunities to interact with the local students. So we've got many units which are shared or [co-curated], as we say, with the domestic students. So there's a mix of cultures and they can exchange notes while they're in there, hopefully not talking in the class but otherwise, on what kind of food you eat and can you show me what the cricket is about, or this footy - create those kinds of friendships that last a long time. We all know when we were in college [...] the friends that we still had.

So outside the course, we also try to provide them opportunities to expand their horizons. I mean, I say that, I mean mutually because the local students also have this fantastic opportunity to learn about other cultures. So it's literally a cultural exchange while they're here.

And the university has put in significant amounts of efforts in ensuring that the learning experience of the students actually includes exposure to the state of the art facilities. We have got fantastic equipment. There are three or four major buildings dedicated to science teaching and science research. And you'll have a look at some of those research projects in a bit. So we try to make sure that the students are using the equipment that is used by research purposes as well.

And we give them as much opportunity as we can to use their own hands-on lab skills. Because that is extremely important to be able to carry out any kind of employment. Mahdi, the next slide, please.

So we have fairly small classes because we really believe in having a personal interaction with the staff members. Students should feel comfortable. They should not hesitate, no matter which country they come from or what is their first language. They should be able to just raise their hand and raise their viewpoint and ask a question, or say, what is their opinion on a certain thing that the lecturer may be mentioning. So we try to keep the classes comfortable and cozy.

We are very easily accessible. Students always know where the lecturers are. They can come around and see us. So accommodation is right very close to where the classes are. And we also combine that with the high quality of science that we provide, which is what our university has consistently done very well in many different kinds of rankings which are used internationally. And we also get the students to interact with our PhD students and master research students in many different ways, including in the technical classes or the projects. So there is a mixing of the different year levels. So they can always understand what they can do next and focus their future plans around that. Thanks, Mahdi.

And in addition to that, we've got a highly committed university and highly committed staff on how to make the teaching student focused. So we try to give opportunities for carrying out research

projects with our industry contacts or student placements where it is possible. And as much as what we call the technical experience or real life problems and real life examples in the classes as well.

Canvas is what we use as an interface to communicate with the students. That's where all the teaching and assessments happen. It's an extremely sophisticated and very easy friendly system to use. It's very easily accessible. Hasn't failed on me at any point at all. The Echo 360 is a recording of the lectures. But Canvas itself has got many different facilities for students to communicate with staff and for staff to communicate with students. So it's extremely comfortable and convenient to use. Thanks, Mahdi.

And in addition to all the scientific learning that happens in our course, the actual university itself [...] many other additional support services for students. For example, there is something called LASC, Learning and Academic Skills Center. They have got fantastically experienced staff who can try to help students to remain on track and say, OK, this is how you can manage your diary. This is how you keep track of your assignments coming up, make sure you are not falling behind. There is help on mathematics.

There is a fantastic library. And you have got access to many different kinds of e-books, actual hard copy books, journal articles. There are workshops given on math, stats. There are workshops given on writing skills. There is a feedback given on how to improve on those skills. So there is a lot more to studying at Swinburne, just outside the Master of Science, Biotech course. So every student can expect all of these kinds of different support services. Thanks, Mahdi.

So in addition to the course, we have also got opportunities for students to work with external industries or have industry linked projects. And I think Enzo is going to discuss some of the research areas which are the research strengths of Swinburne. And for undergraduate courses, we've got it more formalised. For postgraduate courses, it depends on which kinds of areas of interest that a student wants to explore more. But [...] all staff members have got different kinds of industry links and they can be utilised to make sure the student gets some kind of connection to the local industries in terms of carrying out a joint project. Thanks, Mahdi.

Yeah. Enzo, would you like to take over from the slide?

Enzo Palombo

Sure. Thank you, Mrinal. Thank you all for joining us this afternoon. You can see from my virtual background it's a beautiful sunny day in Melbourne. That's a photo of our about campus and you can see it's not too far from the center of the city of Melbourne, very good location . And it's easily accessible by public transport and other means.

So our students really do love being on the campus and being able to explore the other parts of Melbourne while they are here studying. Just to give you some perspective of the types of career outcomes from this course, and I know the careers are an important part of people's consideration when they do want to undertake study, particularly with their coming to study in another country . And parents, of course, are very conscious of that and want to know what sort of jobs, what sort of careers will my son and daughter be interning when they complete their studies.

This list here is not exhaustive. There are probably things on this list that we haven't covered. But one of the important things to consider is this program is really a gateway to many other opportunities for students. And they can choose their path beyond the program.

Some students want to simply want to establish themselves in a job and a career. And the good thing about studying this course in Melbourne is that Melbourne is really one of the centers of biotechnology in Australia and in the Pacific region, in the Asia-Pacific region.

We have many, many industries that are set up in Melbourne, both local industries and homegrown industries, Australian industries, and also many multinational companies. Some of the big drug companies, some of the big pharmaceutical companies have set up offices and facilities in Melbourne quite close to our campus, in fact. And many of our graduates do end up working for those companies.

We also have many of the local and multinational food industry food companies, some of the large dairy producers like Fonterra and Parmalat which are New Zealand and European based have their facilities in Australia because we take advantage of our agricultural sector. We have very good primary industries. And with that goes the need to develop new types of, for example, foods and drugs, nutraceuticals, cosmetics, and those sort of industries which do rely on students who have the know how and the capacity that is what we deliver for this program.

So the point is that we are producing graduates who have the hands on skills to be able to quickly adapt and utilise those skills in a wide variety of industries both locally and potentially even internationally. And many of our students have ended up in those types of organisations and have made a very good career using this particular program as a springboard.

The other interesting thing to consider is that a Master's qualification is one which is very highly valued by employers. They want people who are highly qualified, highly trained, and have the hands on skills and have learned those particular skills during their studies. So the program delivers both the intellectual and academic qualifications, but also the hands on skills that are required by the industries in which these students will become, hopefully, contributors in the long term.

The other point is important to realise is not just as an endpoint for the academic careers, but this program also requires an opportunity to go into further study. And Mahdi, if you want to go to the next slide - we also have the opportunity of our students to enter into our research programs and particularly our PhD programs. A number of our Master's graduates have pathwayed into our PhD programs. And in fact, many of them have become, I would consider, [our best of the] PhD graduates.

And again, the list here is not exhaustive but shows some of the areas of research where we have strengths at Swinburne. And in particular, as Mrinal mentioned, many of these are supported by local industries and local collaborators, other universities and research organisations. And again, Melbourne is an important harbor of activity for these types of research programs.

So our graduates find opportunities both in terms of their careers but if they want to also enhance their educational qualifications, this program provides that stepping stone to things like PhD

qualification and then potentially even to pathways to academia, to become people like myself and Mrinal who are academics working at a university.

So I hope that gives you some perspective and some idea of both what the program involves but also what the program can lead our students into both in terms of career pathways and further opportunities to undertake research programs. I think I'll leave it there and possibly leave the conversation now in your hands to ask any questions you may have about the program and anything which you some clarification.

Just as an example to elaborate the point that Mrinal made about the facilities, just a few snapshots of photos of people working in our laboratories. And you can see just the example there of the state of the art high end, high sophisticated equipment that our students will be able to access while they are studying.

This program is not just an academic program that teaches a theme, we also encourage our students and demand of our students that they will become proficient professional in science using these types of sophisticated equipment. And here's some examples, in fact, some of the students in these photos are our Master's students who have graduated on even to become PhD students. So they're very highly trained, highly qualified graduates.

Next slide, if we have another slide. So at this point, that's just a summary of the presentation, what the course involves, what the different parts of the course in terms of the subjects that are taught, and what the opportunities are beyond the course for our graduates.

So again, I'll leave it there now and we can hopefully answer any questions that come through [for the discussion].

Venus Liao

Thank you very much Enzo and Mrinal for a wonderful presentation on biotechnology. I do have experienced some quite unstable internet connection here. I'm not sure how the experience is to the participants. But let's move on to the Q&A session.

If you have any questions, please type your question in the Q&A box down below and we will go through them together with you all today. We have just one question coming during your presentation, Enzo, asking, what is the example of biotechnology product in daily life.

Enzo Palombo

Well, where do we start? One of the favorite things in my own life and I think in many people's lives is food. And food has many applications where science contributes to both the quality and the variety of foods. If we think of fermentation, fermentation is a process which has been around for many, many years, many hundreds of thousands of years potentially. But we apply modern science to make sure fermentation is a much more efficient process to produce new, novel foods and particularly foods that are safe.

So part of understanding about food technology is to understand the underlying principles and process that leads to the food turning from product into final fermented food. And that cuts across

many different cultures, many different types of foods, both things like dairy products, for example. But certainly that's one area.

Drugs, I mean we all take medicines. We all need medicines. We all rely on a safe and steady supply of pharmaceutical products. Again, biotechnology is key to that, designing things like drugs and vaccines and new types of ways to treat disease. It all comes down to that biotechnology.

If we want to write that to the local or the recent and the current pandemic, we need to understand the things that cause the diseases and how we apply techniques to test, diagnose, and treat infected people. That's all part of biotechnology. Mrinal, [...] comment too.

Mrinal Bhawe

Well, insulin is a classic example. The supply of insulin worldwide really depends on biotechnology. And the example that you gave, Enzo, all of our students will know exactly what this testing regimens are. There are two different kinds of tests the PCR and antibody tests which are being [...] worldwide. Our course actually includes teaching the principles of all of those.

Venus Liao

Absolutely, much needed knowledge, especially during pandemic. Now everyone is trying to get a hold of vaccine and drugs [...] hopefully to get through to the end of the tunnel soon. We've got another question coming in now, asking which one is better, learning biotech or food tech for career opportunity. Either Mrinal or Enzo, if you could take this question and [...].

Enzo Palombo

I can start that one, Mrinal, if you don't mind. The food tech is really focused on that particular industry and usually relies on training people who are going to understand about food quality and food safety testing. So it's much more limited to that particular industry.

Biotechnology, by definition, is broader than that. It includes food. But many of the things that you are learning can be applied to other industries. So if you graduate with a degree or a qualification in food technology, you have almost limited yourself to that particular industry. Whereas biotechnology is much broader. And yes, you can work in food but you can work in many other areas too-- agriculture, pharmaceuticals, drug discovery, all those types of things.

Venus Liao

Mrinal, do you have any more to adding?

Mrinal Bhawe

No. [...]

Venus Liao

It's a good one. I mean, it's very uncertain to know what the world will become after the pandemic ends. And help yourself to open up to more opportunities is always the positive side. All right.

Next question, will the Master of Public Health be open for many job opportunities? What are they? How is the demand on completion?

Mahdi Shariatian

May I just jump in on this one, Venus? We are more than happy to-- because this webinar is focused on science and biotechnology. And we are happy to take your question if you want to leave your details and email in the chat area. And we'll take that up with the relevant academics. Thank you very much for that.

Venus Liao

Thank you very much, Mahdi. Can food science background students study Master of Biotechnology.

Mrinal Bhava

Yes they can. Because the entry requirements are a degree in biological sciences. So they can definitely enter. Sometimes the students are not terribly clear on what a course is about or they're not sure about it. We say, enroll at a graduate diploma level and see how you go.

Because there is that exit point. And students who finish their graduate diploma can, of course, continue to the second year to get their master's degree as well. And also, if people have got a job in that area and they just want to see what biotechnology is about, they can take maybe a couple units at a time and keep studying. And then when they decide, yes, sure, I want to just finish the Master's course.

So there are progression ways. One can be on the slower end longer part until they're sure about their area of interest. Or we can accommodate many different entry requirements.

Venus Liao

We are on study background now. Maybe Mahdi, can you help us to refresh the idea and information about entry requirements? Does this program require a [...] background and what are they?

Mahdi Shariatian

Yes, it does require. And I wanted to ask a follow up question on that, Mrinal. So does a food science background of students with a bachelor in that area be eligible to enter the Masters? Considering that international students may not be able to use the pathway option.

Mrinal Bhava

For international students?

Mahdi Shariatian

Yeah.

Mrinal Bhawe

Yeah, generally what happens is when we get the applications, I look at all the units that they have done. And it's just that when you say of course [...]. I can say that all degrees [...] food science are actually comparable. Because some people might be teaching certain units in food science and they literally would be dedicated to making better food products. So they could have the full size as in taught in other kinds of colleges, like chefs, those kinds of areas. That may not be appropriate.

But I do know for sure there are some food science degrees which are called biochemistry units and chemistry units. They might be better suited. So of course, we can look at their transcript and take it case by case.

Mahdi Shariatian

That's a great answer. And also, so basically there is chemistry and biochemistry. And there are studies that they'll be able to get to [the science] biotechnology.

Mrinal Bhawe

Yeah. They'll be better prepared in the sense students can start. But we also want them to do well and develop that affinity to the studies as well. So we want to make it a comfortable transition.

Mahdi Shariatian

Thank you, Mrinal, that's really [...] now.

Venus Liao

Thank you, Mrinal. We are on key units as the study background, so chemistry, biochemistry, are there any other key units that we should know for international students?

Mrinal Bhawe

Microbiology.

Venus Liao

Anything else?

Mrinal Bhawe

Genetics. All of these areas help, and immunology. So not every student will have every area. But a good sample of these areas is in the right direction for biotechnology.

Enzo Palombo

We've had students who've had a pharmacology background.

Mrinal Bhawe

Yep. Oh, yes. We've got many students, yeah.

Venus Liao

Wonderful. Mahdi, I'm just going to move on to the next question.

Mahdi Shariatian

Please do. Thank you.

Venus Liao

The agent is asking here what is the difference between biotechnology and biomedicine. Mrinal or Enzo, can you help us to understand more?

Enzo Palombo

In traditional terminology, biomedicine is really based around the medical profession, people who work, potentially, in hospitals and health care facilities. Biotechnology is-- the word technology or the part of the world technology indicates it's more of an applied science. You are using the fundamental knowledge and using these to do something. And that could be industrial, environmental, or agricultural. It is not limited to the medical sector. It's broader than the medical sector.

Certainly biotechnology traditionally has come from things like, as Mrinal mentioned, insulin, developing a drug to treat diabetes, which is a medical condition. But it's broader than that. Because the tools and the techniques that you learn can be applied broader than simply the health and medical sector.

Mrinal Bhava

Just exactly those examples. The biomedicine course, for example, will have studies of human anatomy and physiology. Biotechnology wouldn't. But biotechnology will say, this is how you can characterise an enzyme, work out whether it is functional or not, those kinds of things. That could come under biotechnology.

Enzo Palombo

If you take it another level, biomedicine looks more at the whole body, perhaps the organs, the function of the human systems and so on. Biotechnology goes deeper than that, looks in the individual cells and the molecules that are in the cells do some work, things like the DNA and the proteins.

And also, it is broader because it includes things like animal and plant science, which biomedicine tends to focus on human physiology and human biology. So again, biotechnology can be applied broader to outside of the human scope.

Venus Liao

Thank you very much. We've got a couple more questions coming in. The first one is asking, is pharmaceutical science also converted in biotech--

Mahdi Shariatian

Covered.

Venus Liao

Sorry, covered.

Enzo Palombo

I won't say strictly. But there are elements like with, say, metabolism, enzyme activity, molecules that do work in the cell is part of pharmaceutical sciences. But pharmaceutical sciences tends to be more around drug discovery and drug development. You don't do that specifically but the skills that you learn can be applied to that as a career after graduation.

Venus Liao

If the student has interests in drugs or cosmetics, should they choose biotech or pharmaceutical science?

Mrinal Bhav

Drugs, I would say they could-- now, if it is drug development, it could [...] pharmaceutical science. Because actually there's a lot of chemistry studied and the structures of the chemicals. However, in the biotechnology course, we can investigate whether a certain drug is effective on the cells or not. Or we can use computer modeling to say, if this drug is going to appropriately bind to the target molecule. Is it going to be effective or not?

Enzo Palombo

And in that sense, many of our projects that we offer as part of this course can include our colleagues from different disciplines, like the chemistry discipline. And they can contribute to some of the learnings for our biotech students.

Venus Liao

All right. Moving on to the next one which I'll take as the last question as we have gone over 2.30 today. Within the Masters course, can student do internship or work placement in biotech company in Australia or do they do it overseas? Either Mrinal or Enzo, if you could help us.

Mrinal Bhav

Yeah. We haven't set it up for a student to do an internship overseas until recently. And we've just heard that a program is being set up for our students to potentially do a small unit overseas. But I haven't come across a description of the actual industry. So that's being looked at as we speak.

Mahdi Shariatian

Just a follow up question on that. Do you have any example of the students who are .. have work as part of their industry project or an internship with Australian companies or global companies, international companies?

Mrinal Bhave

I can give several examples of the major research projects which are actually on the research area I have collaborations with. For example, with the Department of Agriculture. And those students have explored exactly those kinds of research areas for their project and then gone on to do further studies in that area as well.

So I work with a staff member from Botanic Gardens. I work with a staff member from the Culture Department. Enzo has worked with many other companies if he would like to expand.

Enzo Palombo

In my own case, I can give examples from many of the local food companies. As a microbiologist, I do a lot of work in terms of food safety. So many of those projects come from the companies that want to explore different aspects of food safety and food quality.

Venus Liao

We've just got this very creative question coming in. I'll quickly throw that to you both. Is creating coronavirus like things also part of the biotechnology innovation?

Mrinal Bhave

Creating?

Enzo Palombo

Yes. Very much. Very much. And I'll give an example which is a local example. Collaborators at the University of Queensland have designed a whole different way of making a coronavirus vaccine. And that is all around understanding how nucleic acids, DNA, RNA, and other molecules in the cell, how they behave and how the proteins we hear about this classic spike protein on the top of the coronavirus, that has to be presented, in a certain way in a vaccine to make sure it's effective. And that's all around understanding how the molecules work, both in the laboratory and also applied in the real world.

The vaccines that have been developed by the groups in Oxford and in the US are all based around totally novel technologies that have all come around through understanding of how the virus works, but how we can manipulate the virus and the components of the virus to make a much more effective and robust immune response in vaccine recipients. So yes, very much, technology [like that is based] around biotechnology.

Venus Liao

Wonderful. Lastly, just before we close the session today, Mahdi, would you be able to tell us if Master of Science, Biotechnology will be available for two intakes of year and also if there are any opportunities for scholarship?

Mahdi Shariatian

Well, quickly, yes. We me offer the program two intakes, in March and August. And yes the scholarship includes a very generous 30% scholarship as part of our suite of postgraduate programs in the faculty.

Venus Liao

Wonderful. Thank you very much. And thank you Mrinal and Enzo for a wonderful presentation on Master of Science in Biotechnology, and for all the participants joining us today, the session, from different parts of the world.

Today's presentation will be emailed to you after the webinar. Join us at our next webinar this Friday on the 31st of July at 2:00 PM to hear about Swinburne mechanical engineering. The invitation for this webinar will be sent out to you all today as well.

Thank you very much and have a nice day, everyone. Stay home and stay safe. Hopefully to see you around soon. Bye.

[END OF TRANSCRIPT]