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DIPARTIMENTO
DI CHIMICA
"UGO SCHIFF"

Corso di Laurea Magistrale in Advances Molecular Sciences Allegato alla SUA del CdS

Sommario

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Composizione Comitato Indirizzo

	Members of the Steering Committee of Master Degree in Advanced Molecular Sciences
Azienda/Ente	
	Companies
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Procter & Gamble, R&D Open Innovation, Bruxelles Innovation Center	Raffaele Scoccianti, scoccianti.r@pg.com
ST Microelectronics, ADG Central R&D, Stradale Primosole 50 | 95121 - Catania | Italy	Sabrina Conoci, sabrina.conoci@st.com
Decarbonization & Environmental R&D, Research & Technological Innovation Eni SpA Via Giacomo Fauser 4 - 28100 Novara (Italy)	Riccardo Po, riccardo.po@eni.com
Eli Lilly Italia SpA Via A. Gramsci 731 50019 Sesto Fiorentino (FI)	Eli Lilly: Sergio Chiuderi, chiuderi_sergio@lilly.com
AM Technology Italia	Massimo Bernardoni, mbernardoni@airlite.com

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ETH Zurich Department of Materials HCI H 525 Vladimir-Prelog-Weg 1-5/10 8093 Zürich, Switzerland	Lucio Isa, lucio.isa@mat.ethz.ch
Max-Planck-Institut für Chemische Energiekonversion, Stiftstrasse 34–36, Mülheim an der Ruhr, 45470, Germany	Wolfgang Lubitz (wolfgang.lubitz@cec.mpg.de)
Department of Chemical Engineering, University College London, WC1 E7JE London, United Kingdom	Alberto Striolo, a.striolo@ucl.ac.uk
Austrian Institute of Technology GmbH, Biosensor Technologies Tulln, Austria	Wofgang Knoll (Wolfgang.Knoll@ait.ac.at)
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Confindustria Firenze Via Valfonda 9 – 50123 Firenze	Francesca Zanobini, francesca.zanobini@confindustriafirenze.it Roberta Colombi, roberta.colombi@confindustriafirenze.it
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Rappresentante Commissione regionale dei soggetti professionali	Anna Maria Papini, annamaria.papini@unifi.it

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Verbali delle consultazioni dei membri del Comitato di Indirizzo per il Corso di Studi Magistrale "Advanced Molecular Sciences"

Consultazione del 17 ottobre 2018

Il Comitato di Indirizzo del Corso di Laurea Magistrale in Advanced Molecular Sciences è stato convocato per via telematica per i giorni 17-22 ottobre dalle ore 9:00

All'ordine del giorno il parere sulla istituzione ed organizzazione del Corso di Laurea Magistrale in Advanced Molecular Sciences.

A complemento della convocazione ai componenti del CI è stata inviata la seguente lettera ed una bozza della descrizione del Corso di Studi (**Outline of the Master Degree in Advanced Molecular Sciences-Prima versione** (vedi parte finale del file).

Testo della lettera

> *Dear Members of the Steering Committee,*
>
> *First of all, on behalf of the organizing committee, I sincerely thank you for your participation in this project and for the useful suggestions that you will kindly return to us.*
>
> *Enclosed please find a short description of the Master Degree, its aims and the courses that will be offered to the enrolled students. Enclosed you will find also the list of the current composition of the committee. Please note that this is just a preliminary version, with a minimal educational offer. We are still working on other courses and topics to be added at a second stage. However, there are strict rules that we must comply with. For example, the number of total credits and the different types of scientific sectors that shall be listed in the final outline. These regulatory restrictions limit the possible choices. At this time, we kindly ask you to openly express all the recommendations and suggestions that you feel will be important for the planning of a top level international Master Degree.*
>
> *Due to the roadmap suggested by our University, please return your comments and advices by the beginning of next week, say Monday October 22.*

Thank you again for your help, your participation is definitely a great resource for the success of our proposal. We are looking forward to receiving your precious inputs.

Best regards.

Il giorno 17 ottobre alle ore 9:00 il Prof. Stefano Chicchi dichiara la seduta aperta

Members of the Steering Committee of Master Degree in Advanced Molecular Sciences	**Presenti**	**Assenti**	**Assenti giustificati**
Luca Contiero	x		
Francesca Micoli,	x		
Ilaria Ferlenghi	x		
Raffaele Scoccianti	x		
Sabrina Conoci	x		
Riccardo Po	x		
Eli Lilly: Sergio Chiuderi	x		
Massimo Bernardoni	x		
Silvia Trasciatti	x		
Luisa Poggi	x		
Elena Ottomani	x		
Corrado Carretti	x		
Maurizio Peruzzini	x		
Stefan Braese	x		
Luisa De Cola	x		
Bengt Norden	x		
Shlomo Magdassi	x		
Lucio Isa	x		
Wolfgang Lubitz	x		
Alberto Striolo	x		
Wofgang Knoll	x		

Francesca Zanobini	**x**		
Roberta Colombi	x		
Andrea Frosini	x		
Anna Maria Papini	x		

Di seguito sono riportasti gli interventi dei membri del C.I.

Interviene il Prof. Wolfgang Lubitz

> I had a look at the roadmap suggested by the university of Florence and find it okay. Certainly, there are things that could be optimized and/or changed – but it is important to offer a rather broad variety of lecture courses – and these depend on the available teachers. The choice will also depend on the preferences of the students. It would thus be too early to criticize your program. I personally – as a physical chemist – would strengthen the part on modern/advanced "physical techniques" – and I also believe the students would need a very solid basis in biochemistry/molecular biology, including modern techniques like synthetic biology, gene editing etc. In this respect it would be good to see the teaching program. One point that is not mentioned is the necessity to visit lectures of invited scientists. I assume that you have this included.

Interviene quindi il prof. Stephan Braese

> I went through the document with a graduate student who was involved in Graduate Schools and went also abroad (he will keep this confidential): And he had the tools to annotate the pdf… In general, we liked this a lot, but had few minor comments (attached). 1) "Outline of the Master Degree in "Advanced Molecular Sciences"" there should be a description what kind of student this course is developed for. is it chemists, physicists, biologists? what skills are required? who is able to apply?
>
> 2) "Material Chemistry and Chemistry for Life Sciences" those two fields of chemistry seem to be quite different. Also, Material Sciences and Life Sciences nearly cover all the chemical sciences. Maybe a more specific definition is needed...focus on materials for life sciences maybe
>
> 3) "As a result, the "excellence" in research will be directly transferred to the training activity offered by the Department" will there be internships within the department to transfer the "excellence?"
>
> 4) "will offer scholarships to support the living expenses of the enrolled foreign students" can only foreign students apply for this?

5) “To this end, the Course will also provide elements of other disciplines such as Biology, Medicine and Engineering” again, this definition is not specific enough. every other chemistry course offers this in the end.

6) “The achieved competences and skills will cover the study of inorganic and organic materials, small bioactive molecules, complex biological macromolecules and diagnostic tools” why not just call it chemistry?

7) “Course E will focus mainly on the coordination chemistry of transition elements and lanthanides and on their role in biological systems and materials” very specific compared to the other courses...why is this the case?

8) “Course G will treat different fundamental topics in Organic Chemistry…” 24 hours in total for organic chemistry is not enough to train students properly

9) “Course H will focus on the organic decoration of nanostructured materials for application in Material and Life sciences.” in the common courses a broad spectra of chemistry is covered, nevertheless there should be a more specific focus on specific parts of chemistry

10) “the thesis work can be carried out either in national or international research laboratories as well as in industries. During this period, the students will strengthen their autonomous skills, critical spirit and attitude to work in a team.” this is interesting as it offers the students the freedom to go abroad. are additional costs also covered with money from the program?

Interviene il Dott. Raffaele Scoccianti

I’d rather like to offer a point of discontinuity suggesting a few lectures, that the course could offer on top of the traditional program and that could help the students to get better prepared to the “real work-life “in industry. I am talking short course of 2 to 4 hours each maximum, no exams, just certificate of attendance (ideally giving some credit if attended): 1 Formulations (building block training on how formulating different products vs. need)

2 Finance for NON FINANCE people (a non specialistic training to provide students with basic, yet fundamental understanding on critical “real-life”business tools/concepts like: Define and learn how to calculate Net Present Value (NPV) of a project , Return of Investment (ROI) ; Total Delivery Cost (TDC), etc…

3 Business Model – to get basic understanding for NON-MARKETING people on the fundamental concepts of consumers value, customer needs, customer relationships, value creation, value capturing etc….

4 Communication in Business – to learn how effectively communicate and target communication to the audience in work context (technical reports, presentations, meetings, etc..)

Points 2 to 4 in particular are a reality against which junior scientist will certainly have to deal/learn as of their day 1 in industry, thus, I think providing some early "foundamental" ground on the matter might be useful and help them in job interviews .

Interviene il Prof. Lucio Isa

I went through the document and in general I find it already of a good level. I have three main comments:

- at the beginning there should be a statement saying what this course aims at and who is it for. Something along the lines of "The department offers a new Master course in Advanced Molecular Sciences to train and educate the next generation of chemists on the cutting edge aspects of research in .... that will give them the skills required for an advanced career in industry and academia. This course is aimed at top Italian and international students with a BSc degree in ....At the end of this degree the students will have acquired skills in..." - the financial aspects of the fellowships need to be clarified. In particular, who is eligible for them. I would base this on excellence alone and not on where the students are coming from. This also raises the point about the admission procedure, which is not discussed at all yet and it is very important to maintain the highest standards of incoming students - the structure of the courses is nice and provides the students with broad overview and the possibility to go for more specialized elective courses. The only exception to me seems to be Course E, which is much more specific than the other common courses.

Interviene la Dott.ssa Francesca Micoli

From my prospective it is very good, the program offered is broad and complete. I would only suggest to specify better at the beginning of the document what kind of student this course is developed for. I like the courses that have been suggested under "other activities" and if possible I would add there something on "finance for no finance people" as already suggested. Also, considering the detail in terms of hours provided for all the courses, I would specify how long stage and thesis will take. I would also mention attendance to seminars from invited speakers.

Interviene il Dott. Sergio Chiuderi

I do not have specific comments on the proposed educational plan, I believe that the "Industrial Bioengineering" section should be defined with details that are missing so far, but I guess this will be done after having kicked-off the new Master Degree.

Interviene il Prof. Alberto Striolo

this appears to be an interesting program. I have a couple of suggestions:

in the description of this new program, it is stated that 'engineering' will be included. However, the only course/module that seems to be directly related to industry is 'industrial biochemistry'. I think there should be at least one other course/module in which chemistry is applied to industrial problems. Your department is strong in such applications, so perhaps an overview of various 'industrial applications of advanced chemistry' could do it. You could also invite industrial speakers to deliver part of the material.

I am glad to see 'Computational Chemistry' as part of the core curriculum. However, this topic could be very vast: what aspects will be included? I suggest to include elements that make a connection with the other courses/modules, for example 'Soft Matter'. Since this is expected to be an international program, perhaps you could identify short stages in a university abroad (Germany, UK, Sweden, for example). I understand this will be a possibility within the research portion, but maybe it could be an option also to spend a few months somewhere else and take a course/module there. Finally, to have a real understanding of what really is that you seek to put in place, maybe you could invite the steering committee to Florence and discuss with the Department, as well as with the first students, how the program is evolving.

Interviene la Dott.ssa Sabrina Conoci

Thanks for the program. I found it well-structured and widely covering all the material chemistry areas.

I have just one comment related to Optional Course “Chemical Biotechnology”. It could be useful to include also some lessons on the methodologies currently used for the detection of nucleic acids like PCR, real Time PCR, Microarray and, above all, sequencing. All these biotechnologies, in fact, are chemically-driven and represents an important field of molecular area (actually, there are several EU call addressing these topics).

Interviene il Dott. Riccardo Po

The program seems well balanced to me; however I have a couple of comments:

1) I suggest including the topic “materials for energy” at least in one of the optional courses (maybe, in “Chemistry of Materials” and/or “Polymers for Advanced Materials”). In fact, energy is – and will be more and more – one the most important R&D filed, and young generation of chemists should have a proper training on this.

2) I noticed that chemists are familiar with lab-scale synthesis of milligrams or grams-amounts of products, but in the industry a basic knowledge of scale-up criteria is very important. For example: how do you have to re-think a sequence of synthetic steps in order to have access to kg-amounts of a given materials (multistep synthesis vs. one-pot) ? which ones are the equipments that can be used, and which one are not convenient ? are column chromatographies always viable ? and so on.

One additional note: I believe it would be useful to explain to the students (maybe 1 hour lesson) how to prepare a scientific paper in an effective way https://pubs.acs.org/page/vi/art_of_scientific_publication.html

Interviene il dott. Massimo Bernardoni

It seems to me that the course is well structured and complete. Afterwards, we could integrate the various courses, such as that of adding the functionalization of surfaces through coating perhaps to the course H.

Il Prof. Stefano Cicchi preso atto degli interventi sopra riportati interviene come sotto riportato

The introduction of the outline was modified following the advices of ***Prof. Isa****. We outlined more clearly the course aims and the students it is offered to.*

Prof. Isa *and* ***Prof. Braese*** *requested more details about scholarships and why they were reserved only to foreign students. This issue is critical, some members of the students and teachers joint local commission questioned this choice as well. However, our University rules dictate that only students from outside Tuscany are eligible for scholarships. The criteria for the assignment are not decided yet but surely the final list will be based on merits acquired by the students during their previous undergraduate career and on a mandatory interview. This interview, a skype call for foreign students, will be aimed to assess the strenght of the candidates' background and their motivation.*

Prof. Braese *and* ***Prof. Isa*** *made a note on the title of course E (now course F): the title was changed in "Advanced Coordination chemistry", which is in line with the other courses.*

Dr. Sabina Conoci*, as well as* ***prof. Lubitz****, questioned about the presence of strong biochemistry and molecular biology courses and of some fundamental biotechnology techniques. We trust that the contents of " Non- covalent and hybrid structures in Life and Material Sciences", "Medicinal Chemistry", "Chemistry and the Omic Sciences" and "Chemical Biotechnology" can meet with their expectations.*

Dr. Po *suggested to add the topic "Materials for energy". This topic will be partly treated within the course entitled "Solid state and material chemistry" concerning*

inorganic materials and partly by "advanced polymeric materials" on the organic side.

***Dr. Scoccianti**, as well as **Dr. Micoli** stressed the importance of soft skills concerning finance, business model and communication in business: to cover these requests we planned to introduce special short courses : courses (no more than 24 h) that can change from year to year, given by invited experts to introduce these soft skills or other important issues that cannot be covered by official courses.*

*Unfortunately, we **cannot fulfil Prof. Striolo's** recommendation concerning the strengthening of the industrial part right now. Hopefully, the situation will change in the near future and we might improve the teaching offer also on this issue.*

***Many of you** asked about invited scientists and seminars: the Campus that hosts our Department includes the Department of Physics and several CNR centres, is scientifically very active and there will be plenty of occasions to have international experts as invited instructors. Furthermore, we plan to organize every year a workshop in which members of the committee will be invited to participate as lectures. Please note that the whole project is supposed to be examined and hopefully approved by some National Committees and should fit strictly to some organizing models. A balance between the best modern teaching programs and some rigid organizing schemes is a challenging exercise.*

La seduta è dichiarata chiusa il giorno 22 0ttobre 2018 alle ore 18

Consultazione del 13 novembre 2018

Il Comitato di Indirizzo del Corso di Laurea Magistrale in Advanced Molecular Sciences è stato convocato per via telematica per i giorni 13-16 novembre dalle ore 9:00.

All'ordine del giorno il parere sulla istituzione ed organizzazione del Corso di Laurea Magistrale in Advanced Molecular Sciences.

A complemento della convocazione ai componenti del CI è stata inviata la seguente lettera ed una nuova bozza della descrizione del Corso di Studi (***Outline of the Master Degree in Advanced Molecular Sciences Seconda versione-***vedi parte finale del file***)***

Testo della lettera:

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Oggetto: Second version of the Outline of the Master Degree in Advanced Molecular Sciences

Dear members of the steering committee of the Master in "Advances Molecular Sciences", enclosed please find the second version of the Master outline. We made our best to follow your advices, fulfil your requests and complete the outline to improve the description of our project. As you can see from the list of the recipients, other experts have joined the committee: we welcome them and we gratefully acknowledge their help.

The most important improvements are:

- *A new course was added to the list of common fundamental courses: "Experimental methods for the study of nanostructured materials". This course is mainly devoted to microscopic and scattering methods. In fact, we planned the acquisition of a new Cryo-EM, whose purchase had been funded by the "Dipartimento di Eccellenza" call. You will find more details in the course program in the enclosed file. This change, due to the strict national rules that limit the number of courses belonging to the same scientific area, forced us to include a mandatory student choice of two courses of physical chemistry among the three offered. Nevertheless, the third course can be later chosen as optional. Moreover, we think this course may satisfy the request of Prof. Lubitz about strengthening the part of advanced physical techniques.*

Two new courses were added, or at least better defined, to the list of optional courses: 1) Medicinal Chemistry and 2) Soft matter materials applied to drug delivery systems, food supplements and cosmetic science. In the courses program file, you will find more details.

- *All courses now have their own detailed program. The programs are not in their final form (the involved teachers will soon have a joint meeting to share and compare their ideas and to remove potential repetitions).*

- *Almost all courses are arranged in the "4+2" credits arrangement, i.e. 32 hours of frontal lessons and 24 hours of laboratory practice. Considering the many hours of laboratory practice, the stage period (experimental activity) and the final experimental thesis work, more than 50% of the educational offer is provided as laboratory practice. We believe that this is a peculiar strength of the entire project.*

Concerning your specific criticisms:

The introduction of the outline was modified following the advices of Prof. Isa. We outlined more clearly the course aims and the students it is offered to. Prof. Isa and Prof. Braese requested more details about scholarships and why they were reserved only to foreign students. This issue is critical, some members of the students and

teachers joint local commission questioned this choice as well. However, our University rules dictate that only students from outside Tuscany are eligible for scholarships. The criteria for the assignment are not decided yet but surely the final list will be based on merits acquired by the students during their previous undergraduate career and on a mandatory interview. This interview, a skype call for foreign students, will be aimed to assess the strenght of the candidates' background and their motivation. Prof. Braese and Prof. Isa made a note on the title of course E (now course F): the title was changed in "Advanced Coordination chemistry", which is in line with the other courses. Dr. Sabina Conoci, as well as prof. Lubitz, questioned about the presence of strong biochemistry and molecular biology courses and of some fundamental biotechnology techniques. We trust that the contents of " Non- covalent and hybrid structures in Life and Material Sciences", "Medicinal Chemistry", "Chemistry and the Omic Sciences" and "Chemical Biotechnology" can meet with their expectations. Dr. Po suggested to add the topic "Materials for energy". This topic will be partly treated within the course entitled "Solid state and material chemistry" concerning inorganic materials and partly by "advanced polymeric materials" on the organic side. Dr. Scoccianti, as well as Dr. Micoli stressed the importance of soft skills concerning finance, business model and communication in business: to cover these requests we planned to introduce special short courses : courses (no more than 24 h) that can change from year to year, given by invited experts to introduce these soft skills or other important issues that cannot be covered by official courses. Unfortunately we cannot fulfil Prof. Striolo's recommendation concerning the strengthening of the industrial part right now. Hopefully, the situation will change in the near future and we might improve the teaching offer also on this issue. Many of you asked about invited scientists and seminars: the Campus that hosts our Department includes the Department of Physics and several CNR centres, is scientifically very active and there will be plenty of occasions to have international experts as invited instructors. Furthermore, we plan to organize every year a workshop in which members of the committee will be invited to participate as lectures. Please note that the whole project is supposed to be examined and hopefully approved by some National Committees and should fit strictly to some organizing models. A balance between the best modern teaching programs and some rigid organizing schemes is a challenging exercise.

Once more, we thank you for your precious attention and look forward to a second round of comments. Due to the schedule set by the University, we kindly ask you to return your comments by Friday 16th November.

Looking forward to receive your comments

Best regards.

Stefano Cicchi

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Allegati alla lettera: **Composizione comitato di indirizzo.doc (**vedi documento**); Outline of the Master Degree in Advanced Molecular Sciences_seconda versione.**

Alle ore 9:00 del giorno 17 Novembre 2018 il Prof. Cicchi dichiara la seduta aperta

Members of the Steering Committee of Master Degree in Advanced Molecular Sciences	**Presenti**	**Assenti**	**Assenti giustificati**
Luca Contiero	x		
Francesca Micoli,	x		
Ilaria Ferlenghi	x		
Raffaele Scoccianti	x		
Sabrina Conoci	x		
Riccardo Po	x		
Eli Lilly: Sergio Chiuderi	x		
Massimo Bernardoni	x		
Silvia Trasciatti	x		
Luisa Poggi	x		
Elena Ottomani	x		
Corrado Carretti	x		
Maurizio Peruzzini	x		
Stefan Braese	x		
Luisa De Cola	x		
Bengt Norden	x		
Shlomo Magdassi	x		
Lucio Isa	x		
Wolfgang Lubitz	x		
Alberto Striolo	x		
Wofgang Knoll	x		
Francesca Zanobini	x		

Roberta Colombi	x		
Andrea Frosini	x		
Anna Maria Papini	x		

A questa convocazione sono arrivati i seguenti commenti:

Interviene il Prof. Alberto Striolo

> This looks like a good program to me. I am sure it can be modified, based on experience and students' satisfaction and success, as time progresses.
>
> Best of luck

Interviene il Dott. Corrado Carretti

> Buongiorno Professore. Da parte mia non ci sono particolari commenti. Mi sembra un piano di corsi completo e ben equilibrato, che recepisce le proposte fatte da alcuni colleghi.
>
> Grazie e buona giornata

Intervien eil Dott. Raffaele Scoccianti

> Dear Stefano,
>
> Thanks for having taken into account the input on the value of soft skills short courses, shall I assume these are captured in the last section:
>
> *Other activities (54 credits)*
>
> *Two free choice courses among those offered within the entire University of Florence.*
>
> *Short courses (up to 3 credits each) will be offered on special topics that will change on a yearly basis and will be taught by academic or industrial experts. For example, on production and marketing, intellectual property, management, good laboratory practices.*
>
> *Stage (6 credits): the stage can be spent in research or industrial laboratories.*
>
> Assuming so, I guess we want to end up with a specific and accurate list among which students can chose, thus on my side, no input on your current proposed version but expectation that a detailed list will be discussed and compiled once the program key features will have been aligned / completed by the University.
>
> Is that right understanding of the process?

Interviene il Prof. Shlomo Magdassi

Dear Stefano,

The program looks fine both in content and organization. I have only two comments :

- I think that the course "Solid state and material chemistry" should be included in the "common courses" part (unless there is a limitation of the numbers of credit points at this part). This can be done by increasing the number of "choice courses" to 4 instead of 3.

- The course "Advanced Polymeric Materials": I suggest to add in the "laboratory practice" synthesis of latex particles

Best wishes

Interveine il prof. Lucio Isa

Dear Prof. Cicchi

many thanks for sending the new document. I now find the introduction of the course much stronger and better posed, and I have no other comments concerning the rest. The study program seems very well presented and certainly interesting.

Il Prof. Stefano Cicchi preso atto degli interventi sopra riportati interviene come sotto riportato

Dear members of the committee,

Thank you for your replay and helpful suggestions.

In detail:

***Raffaele Scoccianti**: yes, you are right. We will prepare a list of available short courses based on your suggestions. We will come back and ask you for precise suggestions later on during next year.*

***Shlomo Magdassi**: thank you for the suggestion. **Unluckily, the number of common courses is limited in number**. However, there is the possibility for student to choose the course as optional. Your suggestion about the preparation of latex nanoparticles will be surely considered.*

Thank you all again for your help.

Looking forward hearing from you later next year and meeting you in Florence

Best regard

Stefano Cicchi

Sulla base dei commenti ricevuti il Comitato di indirizzo approva l'istituzione e l'organizzazione del Corso di Laurea Magistrale in Advanced Molecular Sciences.

La seduta è dichiarata chiusa il giorno 22 ottobre 2018 alle ore 18.

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DIPARTIMENTO
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Verbali delle riunioni della Commissisone Didattica del Dipartimento di Chimica "U. SCHIFF"

Verbale della riunione del 10/04/2018, ore 14:00

Componenti:
Prof. Barbara Valtancoli, PO ssd CHIM/03, Presidente
Prof. Debora Berti, PO ssd CHIM/02
Prof. Anna Rita Bilia, PA - ssd CHIM/09
Prof. Giovanna Marrazza, PA - ssd CHIM/01
Prof. Stefano Menichetti, PO ssd CHIM/06
Dr.ssa Marilena Ricci, RTI ssd CHIM/12
Prof. Antonella Salvini, PA ssd CHIM/04
Prof. Paola Turano, PA ssd CHIM/03

Commissione didattica di Dipartimento			
Riunione del 10 aprile 2018			
	Presente	Assente G	Assente
Barbara Valtancoli	x		
Debora Berti	x		
Anna Rita Bilia		x	
Giovanna Marrazza		x	
Stefano Menichetti			
Marilena Ricci	x		
Antonella Salvini	x		
Paola Turano		x	
Rappresentanti degli studenti in Consiglio di Dipartimento			
Bianchi Eugenio	x		
Blanche Leonard		x	
Carlino Marietta	x		
Casini Marilù			
Cioni Matteo			x
Conti Giulia			x
Ganachaud Rachel Maria			x
Macchia Lorenzo		x	
Moretti Chiara			x
Tinacci Lorenzo	x		
Tino Angela Sofia			x

E' presente la dott.ssa Simonetta Agostini, invitata a partecipare in qualità di referente per la didattica per il Dipartimento di Chimica.
La Commissione è stata convocata via mail in data 04/04/2018 per il giorno 10 aprile 2018 alle ore 14:00 con il seguente ordine del giorno:

1. Elezione rappresentanti studenti in Commissione
2. Programmazione didattica erogata 2018-19
3. Laurea Magistrale in lingua inglese
4. Varie e eventuali

L'attuale Commissione è composta da docenti che hanno dato la loro disponibilità e sono stati nominati dal Direttore di Dipartimento nella seduta del Consiglio di Dipartimento del 18 dicembre 2017. In occasione della riunione della Commissione Didattica nella sua nuova composizione, sono stati convocati tutti i rappresentanti degli studenti componenti del Consiglio di Dipartimento per provvedere all'elezione da e fra di loro della componente studentesca della Commissione.

Il Presidente comincia la trattazione dei punti all'Ordine del giorno:

1. Elezione rappresentanti studenti in Commissione Didattica

Gli studenti presenti sono 3, quindi una minima rappresentanza rispetto alla totalità degli studenti in Consiglio che sono attualmente 11.
Non potendosi procedere alle elezioni, il Presidente suggerisce che le elezioni vengano rinviate ad altra data che verrà concordata con la Segreteria compatibilmente con la disponibilità degli studenti.

2. Programmazione didattica erogata 2018-19

Viene esaminata la Programmazione didattica erogata per l'a.a. 18/19, come estrapolata dal programma Programdid e inviata a tutti i componenti.
La Commissione suggerisce di effettuare delle modifiche ad alcune iscrizioni di esami soprattutto per quanto riguarda il numero delle ore di didattica e delle ore di laboratorio e di esercitazioni.

3. Laurea Magistrale in lingua inglese

La prof. Valtancoli introduce la presentazione del nuovo corso di Laurea in Chimica classe LM-54 in lingua inglese, descrivendo le caratteristiche che potrebbe avere il nuovo corso, la sua struttura, le sue peculiari finalità didattiche-formative. Il corso è al momento in via di progettazione.

4. Varie e eventuali

Alle ore 16 la seduta è chiusa

Verbale della riunione telematica del 30 ottobre 2018

La Commissione Didattica del Dipartimento di Chimica "Ugo Schiff" è convocata per via telematica con procedura d'urgenza il giorno 30 ottobre 2018 dalle ore 9.00 alle ore 17.00 con il seguente ordine del giorno:

Laurea Magistrale in lingua inglese "Advanced Molecular Sciences"

Vi allego una breve descrizione della laurea, i programmi dei corsi, e i commenti dei membri del C.I.
Vi prego di far pervenire i vostri commenti, critiche e suggerimenti oltre che ai membri della Commissione al Prof. Cicchi che coordina i lavori della Commissione e ci legge in copia
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Barbara Valtancoli

I documenti allegati sono: (Commenti del Comitato, parte integrante del verbale del Comitato di Indirizzo), Allegato *Outline of the Master Degree in Advanced Molecular Science*s la composizione del Comitato di Indirizzo ed i loro commenti (vedi verbale relativo)

Commissione didattica di Dipartimento			
Riunione del 10 aprile 2018			
	Presente	Assente G	Assente
Barbara Valtancoli	x		
Debora Berti	x		
Anna Rita Bilia	x		
Giovanna Marrazza	x		
Stefano Menichetti	x		
Marilena Ricci	x		
Antonella Salvini	x		
Paola Turano	x		
Rappresentanti degli studenti in Consiglio di Dipartimento			
Bianchi Eugenio	x		
Blanche Leonard	x		
Carlino Marietta	x		
Casini Marilù	x		
Cioni Matteo	x		
Conti Giulia	x		

Ganachaud Rachel Maria	x		
Macchia Lorenzo	x		
Moretti Chiara	x		
Tinacci Lorenzo	x		
Tino Angela Sofia			x

Dalle ore 9 del 30 ottobre 2918 la seduta è aperta

Interviene la Prof. Francesca Maestrelli

Buongiorno,

volevo segnalare che a pagina 5 in merito a Optional Courses è indicato che gli studenti sceglieranno 3 corsi opzionali per un totale di 24 crediti, in realtà sono 4 corsi da 6 CFU ciascuno giusto? Inoltre vedo che tutti i corsi opzionali hanno 4 CFU di lezioni teoriche e 2 di laboratorio), è necessario che tutti i corsi opzionali abbiano una parte pratica di laboratorio? In tal caso sarebbero da svolgere nei laboratori didattici di Chimica?

Grazie

Interviene il Prof. Cicchi:

grazie, è un nostro errore, l'abbiamo corretto. Non è obbligatorio che ogni corso sia 4+2 ma è auspicabile. I laboratori possono essere svolti presso il Dipartimento di Chimica oppure presso i laboratori di ricerca seguendo le preferenze del docente.

Interviene la Prof.ssa Antonella Salvini:

In relazione alla proposta per la nuova Laurea in inglese ho valutato il materiale inviato e invio le mie osservazioni:

1) In generale la proposta della nuova laurea appare interessante proponendosi come tematicamente alternativa alla laurea già esistente. In tal senso, per un'adeguata differenziazione delle tematiche tra due corsi di laurea di pari dignità, raccomando nell'ultima fase di valutazione dei contenuti dei corsi uno sforzo aggiuntivo in tutti i settori.

2) Per quanto riguarda l'area affine alla Chimica Industriale, il corso proposto come "Polymer for advanced material" per il settore CHIM/05 dovrà essere coperto con docenti del settore affine CHIM/04 (in un prossimo futuro dovrebbero confluire nello stesso settore insieme ad altri 2 settori) in quanto in Italia esiste un solo ricercatore CHIM/05 in Basilicata mentre tutti gli altri chimici industriali e i polimeristi sono confluiti nel settore CHIM/04. Nel nostro Dipartimento, tra i docenti del settore CHIM/04, ci sono adeguate disponibilità di copertura.

3) I docenti del gruppo CHIM/04, propongono la variazione del nome "Polymer for advanced material" con quello "Advanced Polymeric Materials".

4) Pur consapevoli delle criticità dei tempi disponibili per la definizione della proposta di una nuova laurea, il tempo a disposizione dei chimici industriali per preparare il programma di tale corso è risultato estremamente ridotto avendo ricevuto la richiesta di presentare il programma soltanto da una settimana e con la maggior parte dei programmi degli altri corsi già definito. Nonostante questa criticità è stato definito un programma

sulla base delle tematiche richieste dagli altri settori e tenendo conto della presenza di altri corsi che presentano argomenti sui materiali polimerici. Seguendo le indicazioni ricevute il programma è stato centrato principalmente su "renewable, biocompatible and sustainable polymers" e "smart polymers and their current applications".
Un ringraziamento credo sia comunque indispensabile per i colleghi che hanno lavorato e stanno lavorando per questa nuova proposta. Il risultato sembra comunque premiare questi sforzi.

Interviene il prof. Cicchi:

Ci sarà bisogno indubbiamente di uno sforzo aggiuntivo di ottimizzazione e differenziazione dei corsi, più semplice una volta definiti in dettaglio i programmi. Grazie per lo sforzo fatto di dettagliare il programma e per il nuovo titolo.

Interviene il Prof. Stefano Menichetti:

Cari colleghi,
a causa di altri impegni sfociati nella visita ANVUR a CTF della scorsa settimana non ho potuto partecipare alle precedenti riunioni della commissione didattica paritetica per cui ho visto il materiale solo ieri. Sono ben consapevole che la proposta presentata sia il frutto di un lavoro serio e difficile, oltre che di una serie di aggiustamenti che si rendono sempre necessari quando, in un corso di nuova attivazione, si devono opportunamente valorizzare tutte le anime e le conoscenze della sede. Inoltre, in questo caso, abbiamo più sedi da gestire ed il 'master' deve inserirsi nel frame del dipartimento di eccellenza.
Detto questo, scorrendo la proposta mi trovo in totale accordo con uno dei referee che dice: "*Course G will treat different fundamental topics in Organic Chemistry…" 24 hours in total for organic chemistry is not enough to train students properly"*
Spero vogliate credere che questo non è la solita greve difesa delle proprie, scarse, competenze quanto un'effettiva lacuna che secondo me emerge dalla lettura dei corsi.
Ringraziandovi del lavoro svolto

Interviene il Prof. Cicchi

É vero, lo spazio è limitato, questi sono gli spazi a disposizione per la costruzione del nuovo corso di laurea. Occorrerà ottimizzare e coordinare i programmi.

Interviene la Prof.ssa Giovanna Marrazza

Cari Tutti,
la proposta per la nuova LM in inglese mi sembra ben strutturata e affronta temi differenti dalla LM in Scienze Chimiche. Tuttavia, come riscontrato anche da Antonella, i contenuti dei corsi appaiono simili a quelli già offerti agli studenti. Sarebbe auspicabile un ulteriore sforzo per differenziarli maggiormente.
Per quanto riguarda l'area CHIM01, non sono sicura che tutti i docenti del settore abbiano partecipato alla definizione del contenuto e al nome del corso. Tuttavia, io proporrei una variazione del nome del corso proposto da: "Analytical methods for innovative applications" in "Innovative analytical methods: theory and applications", in quanto

immagino che saranno illustrati nuovi metodi analitici con applicazioni reali e non i metodi analitici classici in nuove applicazioni.

Interviene il Prof. Cicchi

l'osservazione è corretta. Una volta definiti i programmi in modo più dettagliato e loro coperture sarà possibile confrontarli e migliorare il lavoro fatto. Per quanto riguarda il titolo posso dire che è un titolo provvisorio e che siamo in attesa di quello definitivo.

Interviene lo Studente Matteo Cioni:

Gentili membri della Commissione Didattica di Dipartimento,
Sono Matteo Cioni e scrivo a nome dei rappresentanti degli studenti in commissione.
Con questa email intendiamo comunicare alcune perplessità in merito alla nuova magistrale in "Advanced Molecular Sciences". Per questo motivo chiediamo chiarimenti a riguardo.
Nel documento "Outline of the Master Degree in "Advanced Molecular Sciences" si fa riferimento a borse di studio rivolte in particolare a studenti stranieri.
The Department will be directly involved in the organization of the Master Course and will offer scholarships to support the living expenses of the enrolled foreign students.
Volevamo sapere che tipo di borse sono? Quante saranno? A quanto ammonta l'importo delle borse?
In più volevamo informazioni in merito alla platea di studenti che potranno candidarsi a queste borse, sono riservate esclusivamente a studenti stranieri? Verranno assegnate con quali criteri (merito, isee, prova di ammissione)?
Altre richieste di chiarimento sono relative alla coesistenza tra la nuova magistrale e quella già esistente. I nuovi insegnamenti attivati per la magistrale avranno ripercussioni sulle coperture didattiche della magistrale esistente? Verranno disattivati insegnamenti?
Esprimiamo invece interesse per gli aspetti interdisciplinari e trasversali del futuro corso. In particolare per la possibilità di coinvolgere docenti provenienti da altre realtà, anche estere.
Fiduciosi di avere chiarimenti circa le nostre domande,
Distinti saluti

Interviene il Prof. Cicchi:

grazie per l'apprezzamento della interdisciplinarità e trasversalità del corso. È prevista la presenza, su invito, di docenti esterni.
Per quanto riguarda le borse, il dipartimento stanzierà 800.000 euro per coprire dieci borse da 10.000 euro per i primi 4 cicli biennali. Potrebbero esserci altre risorse, non sappiamo con certezza, dalla Scuola Normale Superiore di Pisa. Le modalità di assegnazione verranno decise dal futuro collegio dei docenti che richiederà anche la vostra partecipazione alla stesura delle regole. Non sono previste ricadute negative sul corso di laurea preesistente, non ci saranno disattivazioni di corsi

Interviene la Prof.ssa Debora Berti:

Carissimi,

intanto ringrazio Stefano Cicchi per l'impegno profuso nella strutturazione della LM in inglese. Ritengo che, nei limiti dei vincoli posti per la definizione dei corsi, e ben consapevole del fatto che l'offerta didattica dell'attuale LM (con cinque curricula) è di fatto estensiva, lo sforzo corrisponda alla migliore offerta possibile, che rispecchi le specificità scientifiche del dipartimento. Mi sembra che rispetto a ciascuno dei curriculum, la proposta sia originale.

Interviene il Prof. Cicchi

Grazie, il lavoro è frutto della collaborazione con la commissione del Dipartimento.
Spero di aver risposto esaurientemente a tutte le osservazioni. Siamo a disposizione se vi è ancora qualche domanda o suggerimento

Dalle ore 18 del 30 ottobre 2018 la seduta è chiusa

Verbale della riunione telematica del 16 novembre 2018

La Commissione Didattica del Dipartimento di Chimica "Ugo Schiff" è convocata per via telematica il giorno 16 novembre 2018 dalle ore 9.00 alle ore 17.00 con il seguente ordine del giorno:

Laurea Magistrale in lingua inglese "Advanced Molecular Sciences"

Vi allego il Regolamento della Laurea e la nuova outline del Corso che contiene tutti programmi e la divisione dei corsi.
In particolare rispetto alla vecchia versione:
-sono stati diminuiti da 24 a 18 i CFU riservati agli insegnamenti affini e integrativi aumentando di 6 CFU la quota riservata alla prova finale. La variazione è stata resa necessaria per diminuire il numero totale di esami (la nostra versione ne prevedeva 13 ma il numero massimo consentito è 12-gli esami a scelta contano 1)
-la Dott.ssa Sorri, utilizzando il simulatore, ha controllato che la laurea rispetti la normativa (da sola e in confronto con Scienze Chimiche) con risultato positivo
- a seguito dell'osservazione della Prof.ssa Salvini (riunione della Commissione Didattica del 30/10/2018) abbiamo variato il settore disciplinare di un insegnamento affine e integrativo da CHIM/05 a CHIM/04, settore più consono ai contenuti e che il Dipartimento è in grado di coprire con Docenti del settore.

La nuova laurea dovrà essere approvata dal Dipartimento,dalla Paritetica della Scuola e dalla Scuola al più tardi entro i primi di dicembre e dall'Ateneo entro l'anno per cui, dopo le ultime revisioni e l'approvazione in Dipartimento, la Commissione incaricata della progettazione ha terminato il suo lavoro. Eventuali fasi successive potranno essere seguite da un "consiglio provvisorio di CdL" costituito dai docenti del CdL e da una

rappresentanza degli studenti.
Rimaniamo in attesa dei vostri pareri sulle variazione e dei vostri commenti e/o suggerimenti
Vi prego di far pervenire i vostri commenti , critiche e suggerimenti oltre che ai membri della Commissione al Prof. Cicchi che coordina i lavori della Commissione e ci legge in copia
Barbara Valtancoli

I documenti allegati sono:

Outline of the Master Degree in Advanced Molecular Sciences second round.docx
Schema Regolamenti CdL con Tabella dei corsi.

Dalle ore 9 del 16 novembre 2018 la seduta è aperta.

Commissione didattica di Dipartimento			
Riunione del 10 aprile 2018			
	Presente	Assente G	Assente
Barbara Valtancoli	x		
Debora Berti	x		
Anna Rita Bilia	x		
Giovanna Marrazza	x		
Stefano Menichetti	x		
Marilena Ricci	x		
Antonella Salvini	x		
Paola Turano	x		
Rappresentanti degli studenti in Consiglio di Dipartimento			
Bianchi Eugenio	x		
Blanche Leonard	x		
Carlino Marietta	x		
Casini Marilù	x		
Cioni Matteo	x		
Conti Giulia	x		
Ganachaud Rachel Maria	x		
Macchia Lorenzo	x		
Moretti Chiara	x		
Tinacci Lorenzo	x		
Tino Angela Sofia			x

Interviene il Prof. Stefano Menichetti:Approvo il documento

Interviene la Prof.ssa Debora Berti: Approvo

Interviene la Prof.ssa Marilena Ricci:Ok per i documenti

Interviene la Prof.ssa Antonella Salvini: Approvo

Interviene la Studentessa Marietta Carlino: Anche per noi studenti va benissimo

Interviene la Prof.ssa Giovanna Marrazza: Approvo

Interviene la Prof.ssa Anna Rita Bilia: Approvo

Non ci sono quindi altre osservazioni o richieste di modifica

Alle ore 19 del 16 novembre 2018 la seduta è chiusa

UNIVERSITÀ
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DIPARTIMENTO
DI CHIMICA
"UGO SCHIFF"

Outline of the Master Degree in "Advanced Molecular Sciences" Prima versione

The Master Degree in "Advanced Molecular Science" is part of a project presented by the Department of Chemistry "Ugo Schiff" of the University of Florence. The project was funded by the Italian Ministry for Education, Universities and Research (MIUR) after awarding to the Department the status of a "Department of Excellence".

Part of this project consists in the organization of a Master Course that will be offered entirely in English. The Course reflects the two main areas of research carried out within the Department, i.e. Material Chemistry and Chemistry for Life Sciences. As a result, the "excellence" in research will be directly transferred to the training activity offered by the Department.

The Department will be directly involved in the organization of the Master Course and will offer scholarships to support the living expenses of the enrolled foreign students.

The aim of the Master Course in "Advanced Molecular Sciences" is to provide the student with a multidisciplinary competence, including developing skills for the design, synthesis and characterization of materials and biological molecules. To this end, the Course will also provide elements of other disciplines such as Biology, Medicine and Engineering. The achieved competences and skills will cover the study of inorganic and organic materials, small bioactive molecules, complex biological macromolecules and diagnostic tools. The graduates will gain the ability to deal with any kind of synthetic, diagnostic and characterization task they will need in their professional life. Their expertise will be a precious asset both for successfully carrying out PhD courses and for entering the job market.

Organization

The overall offer will consist in 120 credits (48 common credits, 24 optional credits and 48 credits of other activities). The laboratory practice is common to almost all courses and more than 20 credits of laboratory activity are offered over the two years.

Common courses

Eight 6-credit courses for a total of 48 credits, will be common for all students and will cover aspects of Analytical Chemistry, Cultural heritage, Physical

Chemistry, Inorganic Chemistry and Organic Chemistry

- Course A will present the most advanced analytical methods used for the investigation of Material and Biological Systems. This course will provide either 48 hours of lectures or 32 hours of lectures and 24 hours of laboratory training.

- Course B will deal with the conservation of Cultural Heritage and will offer an overview of new materials and new techniques in this field. This course will provide 32 hours of lectures and 24 hours of laboratory training.
- Course C will cover the area of Soft Matter Materials, their properties, characterization and applications. This course will provide 48 hours of lectures.
- Course D will focus on computational chemistry and its application to complex systems. The latter is organized in collaboration with Scuola Normale Superiore in Pisa. This course will provide 48 hours of lectures.
- Course E will focus mainly on the coordination chemistry of transition elements and lanthanides and on their role in biological systems and materials. This course will provide 48 hours of lectures.
- Course F, organized in two modules will address noncovalent interactions for hard materials and solution systems: Hard Materials (i.e. description of materials, their production and characterization) and Solution Systems (focused on biological assemblies). Each module will be organized in 16 hours of lectures and 12 hours of laboratory training.

- Course G will treat different fundamental topics in Organic Chemistry, such as advances organometallic chemistry, current synthetic approaches, peptides and carbohydrates. Special attention will be given to the synthesis or modification of materials and biological systems. This course will provide 32 hours of lectures and 24 hours of laboratory training.
- Course H will focus on the organic decoration of nanostructured materials for application in Material and Life sciences. This course will provide 32 hours of lectures and 24 hours of laboratory training.

Optional Courses

Students will choose and attend three optional courses for a total of 24 credits. These courses belong to areas of Science that are not represented in the common courses group. Their role is to provide a flexible choice to support the students in their educational planning according to their own personal interests. These courses approach topics related to medicine, engineering, biology, material sciences and pharmaceutical sciences and are intended to provide the relevant specialized information to complete the cultural and professional background of the students. The optional course are:
Chemistry of materials (32 hours of lessons and 24 hours of laboratory activity): solid state, elements of crystallography, materials for confinement, optical and magnetic applications.
Pharmaceutical Chemistry (32 hours of lessons an 24 hours of laboratory activity): advanced notions for the production of biological drugs, vaccines, etc.
Polymers for advanced materials (32 hours of lessons and 24 hours of laboratory activity): properties of polymers, synthetic approach and current applications of polymers, smart polymers, biocompatible materials
Chemistry and the Omic Sciences (32 hours of lessons and 24 hours of laboratory activity): laboratory methods for various omics. Basic principles of the common analytical tools. Applications to biotechnology, health and pharmaceuticals.
Chemical Biotechnology (32 hours of lessons and 24 hours of laboratory activity): Production of DNA, RNA, proteins. Isotope labeling. Introduction of non-natural amino acids and nucleotides.

Characterization, quality control. Bioethical aspects

Industrial Bioengineering: (32 hours of lessons and 24 hours of laboratory activity) Biocompatible materials

Other activities

(48 credits)

Two *free choice courses* among those offered within the entire University of Florence. Short courses, named ADE Courses, (up to 3 credits each) will be offered on special topics that will change on a yearly basis and will be taught by academic or industrial experts. For example on production and marketing, intellectual property, management, good laboratory practices.
Stage (6 credits): the stage can be spent in research or industrial laboratories.
Thesis work (30 credits): the thesis work can be carried out either in national or international research laboratories as well as in industries. During this period, the students will strengthen their autonomous skills, critical spirit and attitude to work in a team.

Area	Scientific sector	Title	Credits
Commons (48 CFU)			
Analytical and Environmental Chemistry, Cultural Heritage			
Course A CHIM01 Analytical chemistry		Analytical methods for innovative applications (6 credits)	4+2
Course B CHIM12 Cultural heritage		Methods and Materials for Cultural Heritage Conservation (6 Credits)	4+2
Inorganic and Physical chemistry			
CHIM02 Physical chemistry			
Course C		Soft matter materials	6
Course D		Computational chemistry	6
CHIM 03 Inorganic Chemistry			
Course E		Transition elements and lanthanides	6
Course F		Non covalent interactions in material and life sciences	4+2
Organic Chemistry			
Chim 06 Organic Chemistry			
Course G		Advanced synthetic methods	4+2
Course H		Synthetic approaches for the decoration of nanostructured materials	4+2
Optional Courses (24 Credits)			
CHIM 07		Chemistry of materials	4+2
CHIM 08		Pharmaceutical Chemistry	4+2
CHIM 05		Polymer for Advanced Material	4+2
MED 46		Chemistry and the Omic Science	4+2
BIO 12		Chemical Biotechnology	4+2
ING-IND 34		Industrial bioengineering	4+2
Other activities (48 CFU)			
Student's choice		ADE Courses and *courses* from the University of Florence	12
Stage			6
Thesis work			30

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DIPARTIMENTO
DI CHIMICA
"UGO SCHIFF"

Outline of the Master Degree in Advanced Molecular Sciences

Seconda versione

The Department of Chemistry of the University of Florence offers a new Master course in *Advanced Molecular Sciences* to train and educate the next generation of chemists on the cutting-edge aspects of research in Chemistry of Materials and Life Sciences that will give them the skills required for an advanced career in industry and academia. The Master will be conducted in English. This course is aimed at Italian and international students with a BSc degree in Chemistry or similar BSc degrees as detailed in the admission rules of the regulation. At the end of this degree students will have acquired skills in the design, synthesis and characterization of materials and biological molecules. To this end, the Course will also provide elements of other disciplines such as Biology, Medicine and Materials Sciences. The achieved competences and skills will cover the study of inorganic and organic materials, small bioactive molecules, complex biological macromolecules and diagnostic tools. The graduates will gain the ability to deal with any kind of synthetic, diagnostic and characterization task they will need in their professional life. Their expertise will be a precious asset both for successfully carrying out PhD courses and for entering the job market.

The Master Degree in *Advanced Molecular Science* is part of a project

presented by the Department of Chemistry that was funded by the Italian Ministry for Education, Universities and Research (MIUR) after awarding to the Department the status of a "Department of Excellence".

Part of this project consists in the organization of a Master Course that will be offered entirely in English. The Course reflects the two main areas of research carried out within the Department, i.e. **Material Chemistry** and **Chemistry for Life Sciences**. As a result, the "excellence" in research will be directly transferred to the training activity offered by the Department.

The Department will be directly involved in the organization of the Master Course and will offer scholarships to support the living expenses of the enrolled foreign students. Scholarships will be awarded to non-local students based on their previous career and of a mandatory interview aiming at assessing their preparation and motivation. All details about enrollment and application for scholarship will be published on the Master's website

Organization

The overall offer will consist in 120 credits (48 common credits, 18 optional credits and 54 credits of other activities). The laboratory practice is common to almost all courses.

Scientific Area	*year*	*Title*	*Scientific sector*	*CFU*	*CFU*
Common courses					***48 CFU***
Analytical and environmental chemistry disciplines	1	Advanced and innovative analytical methods for applications in life sciences	CHIM/01	6	
	1	Methods and Materials for Cultural Heritage Conservation	CHIM/12	6	
Inorganic chemistry and chemical physical disciplines	*1*	Advanced Coordination Chemistry	*CHIM/03*	*6*	
	1	Non-covalent and hybrid structures in Life and Material Sciences	*CHIM/03*	*6*	
		Choice of two courses among the following three:			
	1	Computational modelling of complex systems	CHIM/02	6	
	1	Experimental methods for the study of nanostructured materials	CHIM/02	6	
	1	Soft matter materials	CHIM/02	6	
Organic Chemistry disciplines	1	Advanced synthetic methods	CHIM/06	6	
	1	Methods for decoration of materials and bioconjugation	CHIM/06	6	
Optional courses					***18 CFU***
		Three courses among the following:			
	2	Solid state and material chemistry	CHIM/07	6	
	1	Medicinal Chemistry	CHIM/08	6	
	2	Advanced Polymeric Materials	CHIM/04	6	
	2	Chemistry and the Omic Science	MED/46	6	
	1	Chemical Biotechnology	BIO/12	6	
	2	Molecular Biology	BIO/10	6	
	2	Soft matter materials applied to drug delivery systems, food supplements and cosmetic science	CHIM/09	6	
Student's choice					***12 CFU***
	2	Two courses chosen by the student		12	
	2	***Other activities***			***6 CFU***
		Stage		6	
	2	***Thesis work***			***36 CFU***
		Thesis work: experimental part		30	
		Thesis work: production of the manuscript and oral presentation		6	
		TOTALE CFU			**120 CFU**

Common courses

Nine 6-credit courses for a total of 48 credits (eight courses will be chosen), will be common for all students and will cover aspects of Analytical Chemistry, Cultural heritage, Physical Chemistry, Inorganic Chemistry and Organic Chemistry

Course A: Advanced and innovative analytical methods for applications in life sciences

32 hours of lectures and 24 hours of laboratory training

Aims: The course deals with advanced analytical techniques and innovative methodologies for applications in the life sciences. On completion of the course students will be able to identify and optimize sampling programs and experiments for answering questions in the field of life sciences; to identify the most appropriate analytical techniques; to formulate and interpret analytical chemistry data in the field of life sciences; to connect the outcome of the analytical chemistry interpretation and scientific progress in life sciences.

Lectures: Analytical workflow in life sciences: from sample preparation and treatment to data acquisition and analysis. Analytical technologies and methodologies in the field of "omics" research: advanced mass spectrometric procedures and techniques, innovative hyphenated techniques, advanced high throughput techniques. Bioelectrochemical methods in life sciences: in vitro and in vivo

monitoring of cell secretion, analytical detection, drug screening, tumor therapy. Innovative diagnostics and POC (Point of Care) analytical tools. Innovative materials for analytical chemistry

Lab practice: Experiments on the topic of the course

Course B: Methods and Materials for Cultural Heritage Conservation

32 hours of lectures and 24 hours of laboratory training

Aims: This course will focus on the basic principles of chemical sciences that underlie modern chemical and material technologies for the understanding of degradation and the design of conservative materials for works of art; building on this basic knowledge, the students will apply such principles to solve some selected issues related to conservation science, which can be promptly translated to a broad range of challenges in academic and non-academic fields.

Lectures:

- What is a work of art from a chemical-physical point of view; Degradation and conservation of works of art; Principles of surface chemistry, self-assembly and soft matter related to cultural artifacts and materials for conservation.
- Detergency.
- Advanced systems for conservation; Cleaning systems: Micelles, microemulsion and more complex fluids;

- Confining cleaning systems in macromolecular scaffolds: Gels; Gel Definition and Gel Classes (physical and chemical gels); Hydrogels and Organogels; Hybrid Gels Gels Advanced Architectures (SIPN, IPN, DS, SCL) General Properties of Polymer Networks; Background on Entropic Elasticity; Elasticity of Physical Gels; Glass transition; Network Swelling; Swelling and Biodegradation; Transport phenomena in gels; Thermally Induced Phase Separation (TIPS) with Solvent Crystallization: Cryogels; Spinodal Decomposition in Ternary Systems: Polymer/Solvent/Non-Solvent; Spinodal Decomposition in Organic – Inorganic Composite Scaffolds; Supercritical Processing.
- Selected Examples of Gels as Scaffolds: pHEMA and PVA based hydrogels Castor oil Organogels
- Confining a complex system (micelle, microemulsion, etc.) into a gel to boost activity and fine control of the confined system. Case studies: cleaning of Leonardo da Vinci, Pollock, Picasso, De Chirico, etc.

Laboratory practice

Course C: Soft Matter Materials

48 hours of lectures

Aims: This course will focus on the theoretical understanding of the physical chemistry of soft condensed matter, from the interactions at the nanoscale to soft materials dynamics and stability on the macro scale. The student is expected to understand the phase behavior, stability and main properties of soft matter. Recognize everyday examples of soft matter systems and use concepts learnt in the course to understand the behavior of such systems. Obtain the main theoretical guidelines and the most important perspectives into practical applications where soft materials are relevant. The properties of nanomaterials will be presented and discussed in relation to some biological complex systems. For example: the Lotus effect, the shark skin and the nanostructure of some outer biological surfaces in relation to interfacial properties, contact angle, wettability, detergency and biofouling prevention. Natural gel-like materials and the local controlled delivery of drugs. The special rheology of some natural fluids and the behavior of some daily life products.

All topics are necessarily multidisciplinary and will include many examples of everyday phenomena and will be of interest to chemists, engineers and biologists as well as physics students.

The course will include guided self-study, lectures given by the course teacher and by invited international experts, final oral exam.

Lectures: After a necessary and short theoretical introduction to the concepts related to surfactants, self-assembly and nanoparticles, the outline of the course is intended to present and focus on some advanced major topics, such as:

* Material properties of gases, liquids and solids; ionic and intermolecular interactions

* Phase transitions and phase diagrams

* Viscous, elastic and viscoelastic behaviour of materials

* Polymeric materials: structure, properties, miscibility and mixing parameters, glass transition

* Self-assembly of simple molecules: from nano- to supramolecular structures.

* Soft matter materials from biological polymers or biologically inspired

* Chemical and physical gels, their properties and swelling behavior.

* Stimuli responsiveness of gels for different applications.

Course D: Experimental methods for the study of nanostructured materials

32 hours of lectures and 24 hours of laboratory training

Aims: Aim of this course is to train students on modern characterization techniques for nanostructured materials in solution, from biological macromolecules and synthetic polymers, to nanoparticles and self-assemblies. The students will learn the basic theoretical principles underpinning experimental methods in direct and indirect space and will receive hands-on laboratory training on microscopic and scattering methods, including those studied and prepared in other courses. Concerning the experimental facilities, these will include those already available in the Dept and the new Cryo-EM, whose purchase had been funded by the "Dipartimento di Eccellenza" call.

Lectures

Direct Observation Techniques:

Optical Microscopy: a) Basics: The compound microscope; Image formation and Illumination paths in the compound microscope; Diffraction and interference in the microscope; Resolution; b) Contrast Techniques: Bright and Dark Field Microscopy; Phase Contrast; Fluorescence Microscopy; Confocal Microscopy; Super-resolution microscopy; Applications: Colloids, Polymers, Biological Systems

Electron Microscopy: a) Electron Optics: Electrostatic and magnetic lenses; b) Transmission Electron Microscopy (TEM): Components of

a TEM microscopy; Elastic and inelastic electron scattering; Contrast principles in TEM; Specialized techniques; Applications: Colloids, Polymers, Biological Systems

Scanning electron microscope (SEM): Components of a SEM microscope; SEM modes: secondary emission and backscattering; Applications: Colloids, Polymers, Biological Systems

Atomic Force Microscopy (AFM): Components: Tip, Cantilever, Detector, Feedback mechanism; Topography: Contact and Non-contact modes; Force Measurements: Force-indentation curves, Elasticity, Microrheology; Additional operation modes. Applications: Colloids, Polymers, Biological Systems

Indirect Methods: Scattering

Fundamentals; Radiation-Matter interaction and Contrast; Radiations: X-Rays, Light, Neutrons

Static Scattering: Structural Properties. System with a discrete number of scatterers: Dilute Systems: Form Factor; Concentrated Systems: Interactions and Structure Factors; Length Scales and Scattering Vector; Ordered and Disordered Systems, Specialized Setups. Applications: Colloids, Polymers, Biological Systems

Laboratory practice

Microscopy:

1) Structure and dynamics of a colloidal dispersion using Confocal Microscopy

2) TEM and SEM investigation of colloidal and biological samples

3) Surface topography with the Atomic Force Microscope Scattering:

4) Determination of a colloidal form factor and structure factor using Small Angle X-Ray Scattering

Course E: Computational modelling of complex systems

32 hours of lectures and 24 hours of case study

Aims: Computational methods are currently of paramount importance to understand the properties of complex systems. This course is aimed at training students on modern computational methods and tools. The students will be able to understand the approximations that underpin these methods, the accuracy that can be achieved, and to compare the results with experimental data. During the case-study sessions, students will be also trained in the use of the new HPC (High Performance Computing) resources of the University of Florence, which will be operative in the early months of 2019.

Lectures: Introduction, Computation of thermodynamic, kinetic and spectroscopic parameters. Quantum mechanical (QM) approaches: accuracy *vs*. feasibility. Molecular mechanics (MM) and molecular dynamics: the problem of transferability. QM/MM: the best of two worlds. What about boundaries? Beyond atomistic approaches: coarse

graining and continuum models. Advanced enhanced simulation techniques.

Case studies: nanostructures and soft matter

Course F: Advanced Coordination Chemistry

48 hours of lectures

Aims: The course aims at providing the fundamental competences to understand the coordination bond and its effect on electronic and structural properties of compounds containing transition elements and lanthanoids. The student is expected to gain the ability to correlate the molecular and electronic structure to a wide range of properties of relevance for diversified applications in life sciences and material sciences.

Lectures: The lectures will cover basic concepts of symmetry, multielectron atoms, term symbols, crystal field theory, molecular orbital theory, vibronic coupling, mixed valence systems.

The most widely employed techniques for the characterization of coordination compounds will be presented: Optical spectroscopies (UV-vis, IR and Raman); resonance techniques (NMR, EPR)

Reactivity of coordination compounds (inert and labile compounds, mechanisms of substitution, redox processes, etc)

Transition elements and lanthanoids in material sciences: luminescent molecular materials, materials for light harvesting, materials for selective gas storage, molecular switches, materials for information storage and processing.

Transition metal ions in biological systems, roles of metal ions in the origin of life on earth, occurrence of metal ions in different living species, metals and nucleic acids, metalloproteins and metalloenzymes, correlation between electronic structure and biological function. Transition metals and lanthanoids as versatile probes for structural investigation and theranostic applications

Course G: Non-covalent and hybrid structures in Life and Material Sciences

32 hours of lectures and 24 hours of laboratory practice

Aims: The course aims at providing to the student the necessary abilities to harness the functional properties resulting from the organization in complex architectures. The student will gain a multidisciplinary experience by applying the concepts of hierarchical organization and multifunctional design in the investigation of biomolecules and hybrid molecular-inorganic architectures.

Lectures: Non-covalent interactions in life sciences: Description of the nature of non-covalent and weak interactions in biomolecules, such as

proteins and nucleic acids. Forces that determine their folding and their tridimensional structure. Molecular recognition and transient interactions. Factors determining partner selectivity. Kinetic and thermodynamics aspects. Metal-dependent protein-protein interactions and transfer. Assembly of large molecular machines and their interaction with substrates and their mode of action. Methods for their study (NMR, EPR, cryo EM, biophysical techniques).

Hybrid architectures in material sciences: Definition of the components of a complex architecture. Classes of solid substrates (insulating, semiconducting, metallic, magnetic, etc.). Growth modes, epitaxy and surface reconstruction. Deposition of functional molecules through physical and chemical methods: vapor deposition, electron-spray deposition, self-assembly from solution and other wet chemistry approaches. Surface mediated coordination chemistry and reactivity. Structural, chemical, and electronic characterization of surfaces and hybrid architectures through STM, LEED, XPS-UPS, SIMS, XAS, local and averaged conductivity measurements.

<u>Laboratory practice:</u>

- Life sciences (12 h): Characterization of some protein-protein interaction and of a metal transfer process as followed by heteronuclear NMR titrations. Determination of structural models of

protein complexes, through experimental data and structural modeling.

- Material sciences (12 h): Preparation of surfaces via PVD and sputtering techniques. Self-assembly of a molecular monolayer. Morphological characterization through STM. XPS characterization. Analysis of morphological and spectroscopic data.

Course H: Advanced synthetic methods

32 hours of lectures and 24 hours of laboratory practice

Aims: The aim of the course is the description of advanced synthetic methods used to produce intermediates, natural and other biologically active compounds. The most important modern synthetic methods will be presented: methods for the formation of C-C bond formations, C-H bond activation, organocatalysis, photocatalysis. At the end of the course the student will be able to plan a synthetic project using modern approaches to synthesis.

Lectures: Modern synthetic methods for the formation of C-C bond: metathesis of alkenes and alkynes, cross coupling reactions, enantioselective aldol condensations, stereoselective synthesis. Synthetic methods for the C-H bond activation. Catalysis with transition metals.

Organocatalysis: principles and applications. Photocatalysis: principles and applications

Laboratory practice:

Use of organocatalysis for the preparation of bioactive molecules.

Use of photocatalysis for the preparation of synthetic intermediates

Preparation of monomers to produce materials for energy through the formation of C-C bond and C-H activation

Course I: Methods for decoration of materials and bioconjugation

32 hours of lectures + 24 hours of laboratory practice

Aims: Introduce students to the chemical functionalization of bioactive haptens, for the decoration of proteins or nanomaterials (peptides, dendrons, silica nanoparticles, metal nanoparticles). Characterization of the armed, selected haptens. Describe the strategies currently used for the bioconjugation of different antigens to a selected carrier. Bifunctional linkers, how choosing the more convenient. Explain how the linkers can be grafted to the hapten. Describe the main characterization techniques at the interface of organic chemistry and materials science. Protein adsorption/protein corona. Overview of potential applications in biomedicine: therapy (vaccines, antimicrobial agents, gene delivery) and smart release of drugs from the nanocarriers and diagnostics (molecular imaging).

Lectures:

- Methods for the functionalization of a selected hapten: suitable protections for a convenient activation
- Methods for multi-haptens presentation: orthogonal activation of different haptens/epitopes
- Methods for the synthesis, characterization and purification of bifunctional linkers suitable for biocompatible reactions.
- Methods for the preparation of stable dispersions of gold nanoparticles in water. The example of glyconanotechnology.
- Biofunctionalization, bioconjugation and characterization of the biofunctional nanomaterials
- Application of the bionanomaterials in biomedicine (theragnostics)

Laboratory practice: A selection of procedures will be made among:

- Synthesis, purification and characterization of a -SR, -NHR' bifunctional linker.
- Functionalization of a hapten/epitope of biological relevance with the thiol-ending linker
- Preparation of gold nanoparticles of different size in water
- Conjugation of the thiol-ending biomolecules to the nanoparticles

- Incorporation of bioconjugated gold nanoparticles into hydrogels for smart release (enzyme and pH-dependent)
- Characterization of the biomolecules conjugates with materials science techniques (TEM, DLS, AFM …protein adsorption/protein corona) in tandem with organic chemistry techniques (NMR, UV, …)

Optional Courses

Students will choose and attend three optional courses for a total of 18 credits.

These courses belong to areas of Science that are not represented in the common courses group. Their role is to provide a flexible choice to support the students in their educational planning according to their own personal interests. These courses approach topics related to medicine, biology, material sciences and pharmaceutical sciences and are intended to provide the relevant specialized information to complete the cultural and professional background of the students.

Solid state and material chemistry

32 hours of lectures and 24 hours of laboratory practice

Aims: The course aims at providing the fundamental concepts of solid state with emphasis on structure-property (magnetic, electronic, optical, etc.) and structure-function (sensing, energy storage, etc.)

relationships. The student will gain competences in crystallography and other X-ray based characterization techniques and will be introduced to the main technological applications of solid-state materials. Lectures: Classification of materials. Introduction to the solid state (band structure, symmetry elements, lattices, point groups, Laue classes, crystal systems, Bravais lattices, space groups). Elements of X-ray diffraction (both from single crystal and microcrystalline material), X-ray crystallography and other non-destructive X-ray techniques (X-ray fluorescence and X-ray microtomography). Dimensional effects in the solid state. Overview of materials for applications in electronics, optics, and energy.

Laboratory practice: Synthesis of metallic and metal-oxide nanoparticles, synthesis of a high temperature superconductor, single crystal and powder X-ray diffraction data collection and analysis, X-ray fluorescence and X-ray microtomography analyses, magnetic and optical characterization.

Medicinal Chemistry

36 hours lectures and 20 hours laboratory training

Aims: The aim of the course is to give to students the basic principles of drug-target interaction and on the importance of physicochemical properties on drug activity. An overview of the drug discovery process will be presented, and computational modeling hand-on exercises will

be performed. The student is expected to become familiar with the chemical aspects of drug discovery.

Lectures (36 h) The fate of drug in the body. Physicochemical properties and drug design. Pharmacodynamics (drug-receptor and drug-enzyme interaction). The drug discovery process. Advanced methods for the production of biological drugs. Strategies for drug optimization.

Laboratory practice (20 h): Computational tool in drug discovery: structure-based and ligand-based methods. Case studies applied to modern drug development

Advanced Polymeric Materials

40 hours of lectures and 12 hours of laboratory practice

Aim: Aim of the course is to be a guide and a support for the student in modern polymer chemistry. First it will be offered an overview on the main synthetic aspects, the control over polymer structure and possible functionalization reactions. After that, the main aspects of renewable, biocompatible and sustainable polymers will be described. Finally, a large part will be dedicated to offer a wide panoramic on smart polymers and their current applications. The student is expected to become familiar with the synthetic aspects of modern polymerization technique and their current applications.

Lectures: The course will include guided self-study, lectures given by the course teachers and by invited international experts, final oral exam.

GENERAL:

- Possible structures (homo- and co-polymers, linear, branched, grafted, network, random, statistic, block, gradient)
- Advanced Synthesis and Characterization (step and chain growth, ATRP, RAFT, ROMP, ROP, living, MIP)
- Renewable, compostable, biocompatible, sustainable polymers (introduction, main type, applications)
- Polymer Functionalization

SMART POLYMERS AND APPLICATIONS

- Pharma-polymers and Polymeric Biomaterials
- Stimuli-responsive polymers
- Smart polymer hydrogels
- Metal Polymers
- Polymers of Intrinsic Porosity (Mixed Matrix Membrane Vapor/Gas adsorption)
- Conducting/Semiconducting/Conjugated Polymers

Laboratory practice

One or more experiences on a complete synthesis and characterization and application of smart polymers.

Chemistry and the Omic Sciences

32 hours of lectures and 24 hours of laboratory practice

Laboratory methods for various omics. Basic principles of the common analytical tools. Applications to biotechnology, health and pharmaceuticals.

Molecular Biology

32 hours of lectures and 24 hours of laboratory training

Production of DNA, RNA, proteins. Isotope labeling. Introduction of non-natural amino acids and nucleotides. Characterization, quality control. Bioethical aspects

Chemical biotechnology

32 hours of lectures and 24 hours of laboratory training

Analytical workflow in life sciences: from bed to bench to be. Sample preparation and treatment, data acquisition and analysis in pediatric and adult clinical chemistry. Analytical technologies and methodologies in the field of "omics" research and diagnostic procedures: advanced mass spectrometric and chromatographic procedures and techniques, advanced high throughput techniques

Other activities

(54 credits)

Two *free choice courses* among those offered within the entire University of Florence.

Short courses (up to 3 credits each) will be offered on special topics that will change on a yearly basis and will be taught by academic or industrial experts. For example, on production and marketing, intellectual property, management, good laboratory practices.

Stage (6 credits): the stage can be spent in research or industrial laboratories.

Thesis work (36 credits): the thesis work can be carried out either in national or international research laboratories as well as in industries. During this period, the students will strengthen their autonomous skills, critical spirit and attitude to work in a team.

Students will have the opportunity to spend periods in foreign universities applying for the Erasmus^{+} project, or during the thesis work within existing collaboration between local and international research groups.