UNIVERSITY OF LIVERPOOL

Chemistry

2+2

THE ORIGINAL RED BRICK

Contents

Why choose the 2+2 at the University of Liverpool?

Our story began in 1881 . . .The University of Liverpool became one of the first civic universities. **The original redbrick.**

Nearly 140 years later, we are still as original as ever - offering different viewpoints and daring ideas. Unique perspectives and a city bursting with character. We are uncovering world firsts through our pioneering research and helping you to forge your own original path. Studying in Liverpool will provide you with an amazing, life-changing university experience that will help you to achieve your ambitions.

Internationally recognised

- Ranked 165th in the Times Higher Education (THE) World University Rankings (2020)
- Ranked 164th in the QS World University Rankings (2019)
- 20th in the UK for research power with 7 subjects ranked in the top 10 in the UK's Research Excellence Framework (both Chemistry and Computer Science ranked #1 in the UK for 4* & 3* research THE 2014).

Benefits of studying in the UK

- Develop communication skills, flexibility, adaptability, empathy and a global outlook – attributes which are highly sought by employers
- No need for an IELTS when applying for postgraduate study in the UK
- Opportunity to explore the UK and Europe.

Graduate outcomes for 2+2ers

- 76% of all 2+2 graduates in Liverpool achieved a 1st or 2:1 upon graduation
- 80% of 2+2 graduates in Liverpool who were in further study after graduating from the University of Liverpool were enrolled in QS Top 100 Universities (DHLE 2020, University of Liverpool analysis of unpublished data)
- Ranked 1st in the Russell Group for graduate employability (DLHE 2016/17).

Support services

Happy students are successful students. In order to help you achieve your ambitions, the University of Liverpool has a wide range of services to support you throughout your studies, including:

- XJTLU student adviser
- Academic advisers
- International advice and guidance
- English Language Centre
- Careers Studio
- Student services (Health, Counselling, etc)
- Guild of Students
- Sports centre
- Libraries
- On-campus accommodation.

The university offers great facilities, the 24-hour library, informational Career Centre and the gym. The campus is a very friendly, passionate place with a good balance of studying and socialising.

Siqi Li
2+2 alumna in Communication and Media

Chemistry at Liverpool

Chemistry graduates are at the heart of science, underpinning some of the world's most dynamic and exciting industries. Our academics are at the forefront of their discipline and we are ranked top in the UK for research excellence.

Thrive in our award-winning undergraduate laboratories

Our £23 million Central Teaching Laboratories offer a unique environment for the study of physical sciences. Chemistry occupies the top floor, which houses synthetic chemistry and physical chemistry labs with new equipment for a wide range of experiments. The new £68 million 'Materials Innovation Factory' is a state-of-the-art materials chemistry research hub funded in collaboration with Unilever and the Government. As an undergraduate, this new facility will be accessible to you during your final year research project.

Learn in a culture of research excellence

We are ranked top in the UK for our research and have world-leading groups in materials chemistry, energy and catalysis, functional interfaces, medicinal and bio-nano chemistry, and theoretical and computational chemistry. We have increased our research in renewable energy and sustainable chemistry, and have created the Stephenson Institute for Renewable Energy which is at the forefront of research. Our excellence in research strongly influences our teaching, and ensures that you are engaged in frontier science in optional modules and in project work.

Gain professional accreditation

Our programme has Bachelor accreditation from the Royal Society of Chemistry (RSC), ensuring your degree with us will set you on the pathway to a successful career.

Benefit from flexible degree programmes

We have optional Chemistry courses in every year of study, so you can tailor your general Chemistry degree to fit your interests and requirements. You may even wish to explore modules from other departments such as Life Sciences or Archaeology.

Bring your learning to life through our Virtual Learning Environment

We integrate e-learning into teaching alongside traditional teaching methods. Our Virtual Learning Environment (VLE) supports all aspects of your studies, and is available via smartphone and tablet as well as PC, ensuring the resources you need are always at your fingertips. You'll find lecture notes and supporting material, recorded lectures, pre-laboratory information, problems and practice questions, assessed work, marking/feedback and vacation revision discussions on the VLE.

Immerse yourself in the study of Chemistry through our exceptional resources

ChemTube3D (**chemtube3d.com**) is our unique website housing interactive 3D animations covering some of the most important topics in an undergraduate chemistry degree. We use this extensively in lectures and for self-study, and the website attracts thousands of visitors every day. In addition, we provide all chemistry students with books to cover the whole Chemistry programme in your second year, along with all the necessary safety equipment, completely free of charge.

How you learn

Laboratory classes in your first year at Liverpool prepares you for independent laboratory work in your final year. Computational modelling and molecular visualisation are reinforced as key skills throughout the programme.

Languages at Liverpool

Studying a programme within Chemistry allows you to study a language as an extracurricular course on top of your degree, or as a module for credit within your degree. See **liverpool.ac.uk/languages** for more information.

How you are assessed

You are assessed by examination at the end of each semester (January and May/June) and by continuous assessment of laboratory practicals, class tests, workshops, tutorials and assignments. You have to pass each year of study before you are allowed to progress to the following year. Re-sit opportunities are available in September at the end of Year Two. You are expected to perform at a 2:1 level if you wish to continue on a MChem programme. All years of study contribute to the final degree classification.

Year Abroad

As a Chemistry student, you can apply for a Year Abroad once you arrive at the University of Liverpool. The Year Abroad will allow you to spend an academic year at one of our partner universities, studying a mixture of subject-related classes and classes related to the culture and history of your host country. Find out more at: **liverpool.ac.uk/study-abroad/outbound/what-is-study-abroad/year-abroad/.**

Summer Abroad

Once you arrive at the University, you'll have the opportunity to apply for one of our exciting Summer Abroad programmes. Summer Abroad allows you to visit a new country whilst undertaking worthwhile academic study. Destinations include Australia, France and Canada. Find out more at: **liverpool.ac.uk/study-abroad/outbound/what-is-study-abroad/summer/.**

Good to know

1st

Ranked 1st in the UK for 4* and 3* research (THE 2014).

97%

are employed or in further study within six months of graduating (DLHE 2016/17).

7th

in the Complete University Guide and 9th in The Times (2020).

We offer accredited programmes.

We offer the chance to study a language.

ROYAL SOCIETY OF CHEMISTRY

Invest in your future

Our graduates develop a wide range of skills including numeracy, problem solving and IT in addition to scientific skills.

Visits to the Department by leading companies such as GlaxoSmithKline and Unilever ensure that you make contact with prospective employers at key stages in your final year. Graduates find employment in many areas, from the pharmaceutical industry to business management. Typical careers of our graduates include assistant analyst, development chemist, research assistant and site chemist.

Recent employers

- GlaxoSmithKline
- Unilever
- IOTA Nanosolutions Ltd
- Perstorp Caprolactones
- Shell
- Towers Watson
- United Utilities.

STAFF PROFILE

Professor Andy Cooper

Professor Cooper is the founding director of the Centre for Materials Discovery and the Materials Innovation Factory. He conducts groundbreaking research in polymeric materials, supercritical fluids, microporous materials, hydrogen storage, metal nanoparticles, organometallics, emulsion-templated materials, and high throughput materials methodology. He has numerous research grants including projects for IBM, Unilever and the Newton Fund (Practical hydrogen fuelled vehicles for China) and teaches a 3rd year module.

Studying at Liverpool has helped me to achieve my dreams by offering a better platform for further application and more chance to get exposure to the advanced research conducted currently. It has also provided me with a solid foundation in the basic knowledge of Chemistry. The flexibility in module choices and the possibility of taking courses in other programmes helps me to get closer to the area that I want to further study in.

He Zhu
2+2 student in Chemistry

Articulation route

Chemistry BSc (Hons)

This programme offers a solid grounding in all aspects of chemistry, while allowing you to incorporate some non-chemical options to broaden your education.

Programme in detail

Your programme shares a common chemistry core, differing only in optional modules with other chemistry programmes in the department. Your optional modules can be chosen from chemistry or non-chemistry courses. This provides a good measure of flexibility and choice for you during the first year at Liverpool.

Building on the foundation you developed at XJTLU, the first year in Liverpool progresses rapidly, with a mix of theory and practical modules to give you a solid grounding in the subject.

By your final year, you will be a proficient chemist, and you will be able to extend your knowledge in the three traditional branches of chemistry. You will also be offered a choice of optional chemistry and non-chemistry modules, or modules in science education for those interested in pursuing a career in teaching. Practical modules in Year Three will continue to develop your skills and knowledge. This may involve conducting mini-projects, relevant in the modern world, to develop your skill set and make you industry-ready.

Key modules

Year Two

Core modules

- Coordination and organometallic chemistry of the D-block metals (CHEM214)
- Key skills for chemists II (CHEM280)
- Measurements in chemistry (CHEM246)
- Organic chemistry II (CHEM231)
- Physical chemistry II (CHEM260)
- Preparative chemistry: synthesis and characterisation (CHEM245).

Optional modules

- An introduction to medicinal chemistry (CHEM248)
- Applied analytical chemistry (CHEM286)
- Chemistry for sustainable technologies (CHEM284)
- Climate, Atmosphere and Oceans (ENVS111)
- Functional organic materials (CHEM241)
- Inorganic applications of group theory (CHEM316)
- Introduction to statistics and probability (MATH162).

You will learn more advanced topics within all the main branches of chemistry and continue to develop your quantitative and key skills.

Practical skills will be developed through stand-alone practical modules and you will have the opportunity to spend between six and nine hours per week in the laboratory.

Year Three

Core modules

- Further organic chemistry (CHEM333)
- Inorganic materials chemistry (CHEM313)
- Key skills for chemists III (CHEM385)
- Modern applications of physical chemistry (BSc) (CHEM352)
- Practical chemistry Year Three (BSc) (CHEM365)
- Year Three chemistry project (BSc) (CHEM356).

Optional modules

- Advanced functional organic materials (CHEM342)
- Biological energy conversion processes (CHEM382)
- Biorenewable chemicals from biomass (CHEM384)
- Chemistry research internship (CHEM309)
- Chemistry for sustainable technologies (CHEM284)
- Heterocyclic chemistry and drug synthesis (CHEM338)
- Inorganic applications of group theory (CHEM316)
- Introduction to chemical engineering for chemists (CHEM396).

In your final year you will continue to study the three main branches of chemistry, organic, inorganic and physical chemistry, but the emphasis is on the application of chemistry to the modern world. You will also further develop skills to enhance your employability and general chemistry skills, including a module on **Further key skills** and **Molecular modelling**.

UoL-XJTLU linked activities

There are a range of linked activities in the Faculty of Science and Engineering including the Department of Chemistry which aim to improve your cultural learning, as well as academic and/or communication skills; hence, your employability skills. Liverpool students pair up with your XJTLU counterparts to undertake an undergraduate assignment which runs on both sites simultaneously. Therefore, the tasks can then be compared and contrasted.

STAFF PROFILE

Dr Gita Sedghi

Dr Gita Sedghi is a senior lecturer in the Department of Chemistry. In addition to conducting pedagogical research and teaching & learning innovation for chemistry undergraduate programmes, she has been awarded a prestigious National Teaching Fellowship by Advance HE for her excellent contribution to the Chemistry department through the introduction of collaborative educational research projects and innovative technology-enhanced learning initiatives. Dr Sedghi teaches numerous 2nd and 3rd year modules.

The experience of studying in Liverpool has been amazing. I thought it would be a big challenge for all Chinese students studying in the UK because of the language barrier and culture differences. I never expected I would receive so much support from our department and it helped me to settle down in a fairly short time. Our department always tries to create opportunities for international students to work with home students. It is really attractive and helpful to me to work with UK students and other international students because we have different cultural backgrounds and sometimes it is very interesting that we can think about a single question from different perspectives.

Wentian Niu
2+2 student in Chemistry

Core and selected optional modules overview Year Two

Module title	Semester	Credit	Module description
An introduction to medicinal chemistry CHEM248	2	7.5	Introduces the fundamental principles that underpin modern medicinal chemistry, including an introduction to targets for drug action, methods of administration, qualitative and quantitative SAR, computer-aided molecular design, and solid phase chemistry/ combinatorial chemistry.
Applied analytical chemistry CHEM286	2	7.5	Provides an understanding of the applications of various analytical techniques and their role in modern research. Demonstrates the fundamental theoretical principles of selected instrumental analytical techniques in the context of their roles in industrial and academic research, to include chemical and pharmaceutical analysis.
Chemistry for sustainable technologies CHEM284	2	7.5	Introduces the basic concepts of sustainability and sustainable development, particularly in relation to their technological underpinnings.
Climate, atmosphere and oceans ENVS111	1	15	Introduces the climate system, the atmosphere and ocean.
Coordination and organometallic chemistry of the D-block metals CHEM214	2	15	Outlines how bonding theories (crystal field, ligand field) have been developed by chemists to rationalise important properties of the d–block elements and introduces the theory underlying the use of appropriate physical and spectroscopic techniques for characterising d–block complexes.
Functional organic materials CHEM241	1	15	Provides students with an understanding of how synthetic polymers are synthesised and characterised.
Inorganic applications of group theory CHEM316	2	7.5	This module aims to demonstrate the underlying importance of symmetry throughout chemistry, with particular applications to spectroscopic selection rules and bonding.
Introduction to statistics and probability MATH162	2	15	This module will introduce topics in statistics and will encourage students to describe and discuss basic statistical methods.
Key skills for chemists II CHEM280	1 and 2	15	Develops quantitative skills, through more advanced skills in the application of mathematics, physics and information technology and further develops general transferable skills in studying, accessing information, oral and written communication, presentation, team working and employability.
Measurements in chemistry CHEM246	2	15	Introduces the practice of taking physical measurements, the critical analysis and evaluation of experimental data, the application of measurements to the study of chemical phenomena and the dissemination of results.
Organic chemistry II CHEM231	1	15	Introduces important carbon-carbon bond forming reactions within a mechanistic and synthetic framework, together with exposure to a selection of stereochemical issues.
Physical chemistry II CHEM260	1 and 2	15	Explains the application of the first and second laws of thermodynamics to chemical reactions.
Preparative chemistry: synthesis and characterisation CHEM245	1	15	Presents a unified approach to the synthesis and characterisation of organic and inorganic compounds and will build on techniques introduced in the first year laboratory courses.

Please note: modules are illustrative only and subject to change.

Core and selected optional modules overview Year Three

Module title	Semester	Credit	Module description
Advanced functional organic materials CHEM342	2	7.5	Demonstrates the relationship between structure and properties of organic materials; provides students with an understanding of some of the advanced characterisation techniques used for organic materials; outlines how computation can be used to guide synthesis of functional organic materials; examines some examples of cutting-edge organic materials research underway at the Department of Chemistry.
Biological energy conversion processes CHEM382	2	7.5	Discusses how fundamental energy conversion in nature occurs by storage of energy in the form of concentration gradients across membranes; introduces chemically pathways for the photosynthesis, respiration, ATP synthesis, the Calvin cycle, the citrate cycle, fermentation; shows the mechanisms behind active transport, nerve signalling, the K/Na pump, muscle contraction and molecular motors.
Biorenewable chemicals from biomass CHEM384	2	7.5	This module provides the scientific and technical foundation to understand the utilisation of biomass, the emerging renewable chemicals industry, biorefineries and the implications that these technologies will have.
Chemistry research internship CHEM309	Summer before Year Three	22.5	You will be provided with an insight into the process of scientific research and debate in a setting different from the University of Liverpool by taking a summer research project outside the UK; you will be exposed to new research and cultural environments; develop the confidence to work independently and in a team; develop your ability to communicate scientific concepts and findings in a variety of formats; and develop your employability skills.
Chemistry for sustainable technologies CHEM284	2	7.5	Introduces the basic concepts of sustainability and sustainable development, particularly in relation to their technological underpinnings.
Further organic chemistry CHEM333	1	15	Consolidates and extends second year knowledge of synthetic and physical organic chemistry.
Heterocyclic chemistry and drug synthesis CHEM338	1	15	Presents the synthesis and reactivity of the most important classes of heterocyclic compounds and to present case studies drawn from major drug classes.
Inorganic materials chemistry CHEM313	1	15	This module aims to enhance students understanding of the fundamental nature of ordered crystalline solids and develops the concept that the structure of materials impact on their properties and applications.
Inorganic applications of group theory CHEM316	2	7.5	Demonstrates the underlying importance of symmetry throughout chemistry, with particular applications to spectroscopic selection rules and bonding.
Introduction to chemical engineering for chemists CHEM396	2	7.5	Gives you an insight into the world of chemical engineering and develops an understanding of the main topics of chemical engineering for chemists in a practical manner.
Key skills for chemists III CHEM385	1	7.5	Develops skills needed for further educational opportunities or employment in a wide range of chemical and non-chemical based sectors.
Modern applications of physical chemistry (BSc) CHEM352	2	15	Explores three areas of contemporary relevance in physical chemistry; physical chemistry of the condensed phase; protein structure and protein folding; and nanotechnology.
Practical chemistry Year Three (BSc) CHEM365	1	22.5	Gives the student practical experience and understanding of advanced practical techniques for organic, inorganic, physical chemistry and theoretical and computational chemistry.
Year Three chemistry project (BSc) CHEM356	2	15	You will be assigned an extended experiment on a synthetic (organic or inorganic), physical (catalysis, electrochemistry, surface science, modelling, nanoparticles) or interdisciplinary theme, according to your own interests and abilities.

Please note: modules are illustrative only and subject to change.

Support in the Department of Chemistry and next steps

As a Chemistry student, you will be a part of the School of Physical Sciences. Within the School of Physical Sciences, you will find a dedicated student support team, offering guidance and advice all the way from enrolment through to your graduation.

Student support office

Located within the main foyer in the Department of Chemistry the Student Support Office provides administrative and pastoral support for chemistry students. The team operates as part of the wider Student Experience Team within the School of Physical Sciences.

The office operates an open door policy allowing you to easily call in with any issues, ask questions or just 'pop in' for a chat.

The office is heavily involved with a number of important processes in the department including attendance monitoring, student work hand-ins and collections, the SSLCs (Staff and Student Liaison Committees), student events and graduations.

Pastoral support

The office has a pastoral care area 'Safe Zone', where you can discuss more personal or confidential issues you may be facing during your study at the University. The office has a wealth of experience dealing with a diverse range of issues from mental health to financial concerns. The Support Team has undertaken counselling courses and has won a number of awards for their contribution to student support at the University. In 2016, Debbie Hitchell was the first ever Professional Services staff member at the University to be awarded the Teaching and Learning Award. John Harpur was awarded the 2016 Outstanding Support Award.

The staff work closely with other University support services including SWAG (Student Welfare Advice and Guidance), University Counselling Services and the Finance Team allowing for any support mechanisms to be put in place allowing you to achieve your goals.

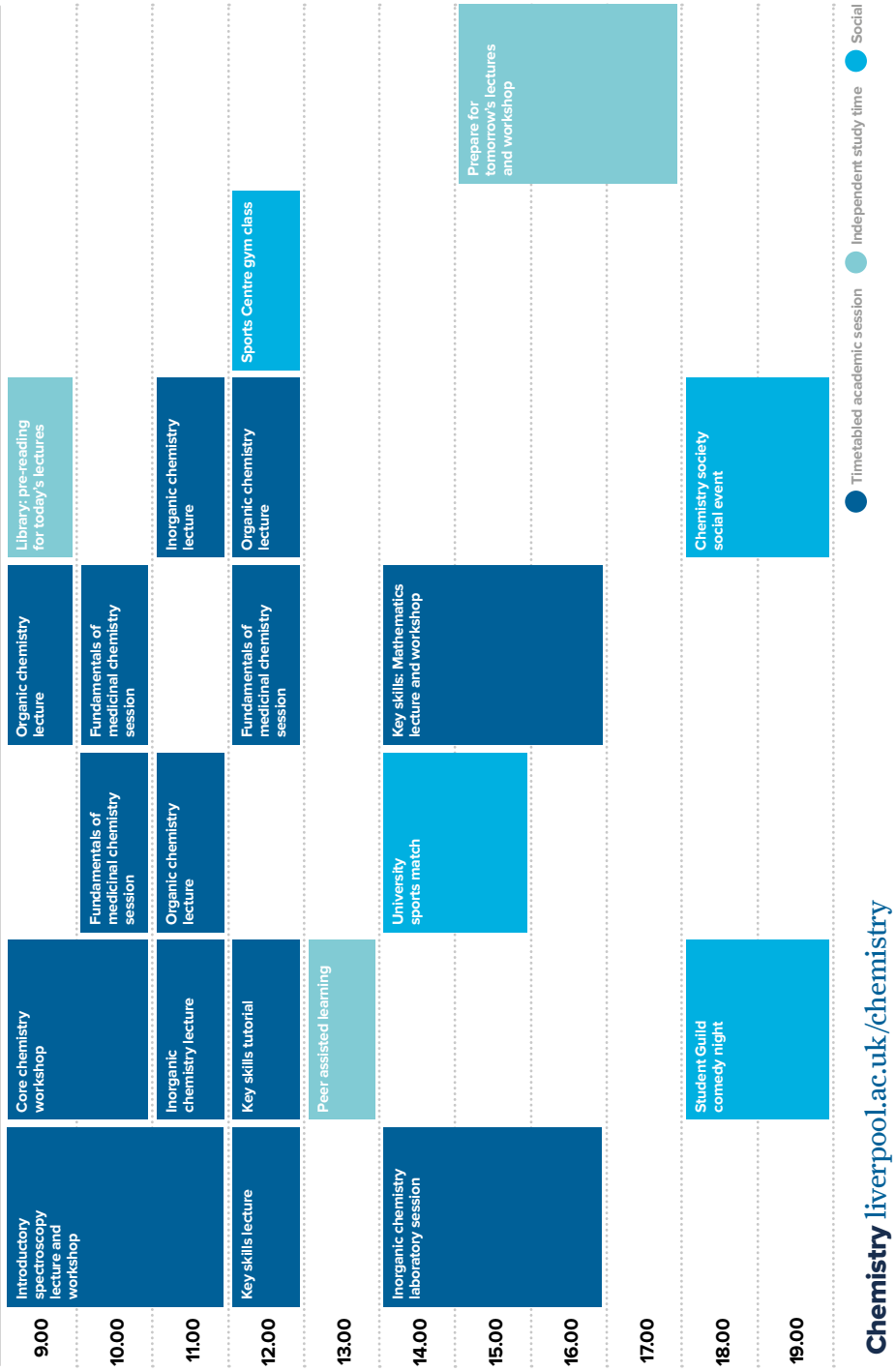
Steps for registration

You will receive pre-arrival information, including a list of optional modules, by July from Dr Gita Sedghi, the XJTLU Link tutor for Chemistry. You will have the opportunity to ask questions about the programme, modules or even the city of Liverpool and will be asked to register for your modules before you arrive in Liverpool.

During your Induction Week, there will be bespoke sessions with the Year Two Coordinator to discuss the modules. You will be able to change your optional modules after this discussion with the Year Two Coordinator.

Sample Timetable

Semester One Typical week



Chemistry liverpool.ac.uk/chemistry

Find out more

liverpool.ac.uk/study

Accommodation: **liverpool.ac.uk/accommodation**
Fees and student finance: **liverpool.ac.uk/money**
Life in Liverpool: **liverpool.ac.uk/study/undergraduate/welcome-to-liverpool**
Student Welfare Advice and Guidance: **liverpool.ac.uk/studentsupport**
@livuniphyssci

Enquiries

Two Plus Two Team
two-plus-two@xjtlu.edu.cn

Chemistry
Department of Chemistry
The University of Liverpool
Crown Street
Liverpool L69 7ZD

liverpool.ac.uk/chemistry