Oxford Prospects Programmes | St Hilda's College UNIVERSITY OF OXFORD

Oxford Prospects Pathway

Navigating Interdisciplinary Frontiers in the Age of AI

Medical Science (MS) Module

01 | MODULE DESCRIPTION

What happens to the brain when we get older? Can stem cells be used to cure any disease? Is ultrasound useful for administering drugs? How can we ethically and effectively use advanced biomaterials? Can AI-driven drug design fully replace traditional methods? How can healthcare systems like the NHS or the US model adapt to new technologies?

"Welcome to Oxford, where you can experience the academic atmosphere of one of the world's most outstanding universities, especially in the medical field, and also appreciate the wonderful buildings of an 800-year-old university. I am sure you will enjoy having a challenging and interesting series of lectures and activities. Once again, a very warm welcome - we're thrilled to have you with us."

Welcome Notes

From rational drug design and AI-driven imaging to precision oncology and clinical proteomics, this module provides a comprehensive, research-led journey through contemporary medical science. Students will investigate the cellular and molecular mechanisms underlying cancer, ageing, and neurological conditions, alongside practical clinical approaches to congenital and sleep-related disorders.
By integrating cutting-edge technologies with evidence-based diagnostics, you will analyze how fundamental scientific discoveries translate into real-world treatments across ethical, systemic, and global healthcare frameworks. Guided by an interdisciplinary perspective, you will develop the rigorous analytical skills required to decode disease complexities, evaluate targeted therapies, navigate regulatory challenges, and actively advance the frontiers of personalised medicine.

The course is for students of:

Medicine, Genetics, Psychology, Public Health, Pharmacology and other related fields.

Module Lead: Professor Sir Walter Bodmer

Professor Sir Walter Bodmer is a renowned geneticist with a wide field of study. He is a Fellow of the Royal Society (FRS), an Honorary Fellow of the Royal Society of Edinburgh (HonFRSE), and a Fellow of the Academy of Medical Sciences (FMedSci).

02 | LEARNING OUTCOMES

Upon completion of this module, students will analyse key strategies in precision medicine and AI, alongside biological mechanisms of cancer, ageing, and neurological disorders. They will evaluate global healthcare ethics to enhance patient care, experience Oxford's research environment firsthand, and collaborate in interdisciplinary teams to present research-informed solutions.

03 | MODULE OVERVIEW

Unit 1: Cellular Pathology, Oncogenesis & Gerontology
- Evolutionary Cancer Biology & Ageing Pathways
- Genomic Profiling & Biomarker Discovery
- Molecular Origins of DNA Mutations
- Precision Oncology & Targeted Radiotherapy

Unit 2: Neuroscience, Brain Research & Digital Health
- Lifespan Dementia Risk & Cohort Science
- Sleep Physiology & Disorder Management
- Parkinson's Mechanisms & Digital Phenotyping
- Pharmacological Interventions & Data-Driven Neuroscience

Unit 3: Advanced Therapeutics, Drug Discovery & Precision Delivery
- Structure-Based & Computer-Aided Drug Design
- Nanoscale & Targeted Delivery Systems
- High-Intensity Focused Ultrasound Therapy
- Proteomics in Precision Medicine

Unit 4: Integrative Physiology & Global Health Technologies
- AI-Driven Medical Imaging & Diagnostics
- Low-Resource Orthopaedic Interventions
- Autonomic Physiology & System Regulation
- Systems Vaccinology & Paediatric Immunisation

Unit 5: Healthcare Systems, Medical Ethics & Clinical Policy
- Ethical Frameworks in Palliative Care
- AI Integration & Clinical Patient Safety
- UK General Practice & Primary Care Models
- Global Health Policy & Equitable System Design

(This syllabus is a proposed framework. The curriculum is subject to annual review and will be updated to incorporate frontier academic topics and emerging advancements in the field.)

Proposed Reading List

- Bear, M.F., Connors, B.W. and Paradiso, M.A. (2020) Neuroscience: Exploring the Brain. 5th ed. Philadelphia, PA: Wolters Kluwer.
- Pezzella, F., Tavassoli, M., & Kerr, D. J. (Eds.). (2019) Oxford Textbook of Cancer Biology. Oxford University Press.
- Hanahan, D. (2022) 'Hallmarks of cancer: New dimensions', Cancer Discovery, 12(1), pp. 31–46.
- Woolf, S.H. (2008) 'The Meaning of Translational Research and Why It Matters', JAMA, 299(2), pp. 211–213.

More readings and resources will be given prior to the start of the programme.

Literature - Language- Digital Culture and Communication Studies (LLD) Module

01 | MODULE DESCRIPTION

How has the rise of digital media transformed journalism? Can we truly deconstruct a text when its words are generated by AI without consciousness or intent? Beyond these technological shifts, we must ask how intercultural narratives and digital platforms interact to construct power, shape human experience, and redefine global identities.

"Welcome to Oxford. Young people like you have been gathering here to read and learn for nine centuries. . If you are curious, this is your city. It may seem aloof, but there is an open door and an open heart for everyone who wants to know more. You belong here."

Welcome Notes

Language and literature do more than record ideas—they construct power, identity, and cultural experience. Moving from classical literature and critical theory to global media and digital culture, this interdisciplinary module investigates how narratives evolve across historical and technological shifts. Students will explore language transformation, modern storytelling, and the impact of AI on communication, while engaging directly with cutting-edge research from Oxford academics. Through rigorous critical analysis and collaborative inquiry, you will develop the analytical tools to decode complex cultural phenomena in an interconnected world.

The course is for students of:

English Language and Literature, Foreign Languages, Linguistics, Journalism, Translation, Chinese Language and Literature, Sociology, Anthropology, History, Drama, Film and Television, Media Studies, Arts, Cross-cultural Communication, Library Studies, Humanities and Education, etc.

Module Lead: Professor Diane Purkiss

Professor Diane Purkiss is Fellow and Tutor of English at Keble College, University of Oxford. She specialises in Renaissance and women's literature, witchcraft and the English Civil War. Purkiss was born in Sydney, Australia, and gained her D.Phil. from Merton College, University of Oxford.

02 | LEARNING OUTCOMES

Upon completion of this module, students will analyse literary texts using critical theory and metaphor analysis, while evaluating how computational tools, AI, and digital media reshape language and identity. Integrating intercultural communication theories, you will collaborate in teams to present research-informed perspectives on complex cultural phenomena.

03 | MODULE OVERVIEW

Unit 1: Narrative Worlds: Power, Imagination, and Representation
- Narrative Construction & Cultural Identity
- Myth-Making & Mythological Transformations
- Gothic Fear & Dark Imagination

Unit 2: Critical Theory, Literary Criticism, and Creative Form
- Theoretical Frameworks and Literary Analysis
- Environmental Justice in Contemporary Literature
- Ecocritical Approaches in Literature

Unit 3: Global Linguistic Transformations and Intercultural Communication
- Endangered Language Preservation & Documentation
- Globalisation & Linguistic Shift
- Cross-Cultural Communication & AI Impact
- Language, Power & Identity Construction

Unit 4: Digital Culture & Media Dynamics
- Digital Media Ecologies: Interactions and Influences
- The Future of News: Audience inside the Story
- Critical Theories of Digital Media and Communication
- Digital Storytelling

Unit 5: Digital Humanities & the Role of AI
- Critical Theories of Digital Media and AI
- AI Translation, Machine Learning, and Global Linguistics
- Deconstruction of Language in the Age of AI
- Digital Humanities: Data-Driven Literary Analysis

(This syllabus is a proposed framework. The curriculum is subject to annual review and will be updated to incorporate frontier academic topics and emerging advancements in the field.)

Proposed Reading List

- Eagleton, T. (2008) Literary Theory: An Introduction. 2nd ed. Malden, MA: Blackwell Publishing.
- Crystal, D. (2006) Language and the Internet. 2nd ed. Cambridge: Cambridge University Press.
- Couldry, N. and Hepp, A. (2017) The Mediated Construction of Reality. Cambridge: Polity Press.
- Heller, M. (2003) 'Globalization, the New Economy, and the Commodification of Language and Identity', Journal of Sociolinguistics, 7(4), pp. 473-492.

More readings and resources will be given prior to the start of the programme.

Politics - Philosophy -Economics - Law (PPEL) Module

01 | MODULE DESCRIPTION

How can we ethically regulate AI? What power does a nation hold in shaping global norms? How can societies manage the spread of misinformation? What characteristics should a leader have in times of crisis?

"We are delighted to welcome you all to Oxford! To make your visit both enriching and memorable, we've curated an exciting programme featuring a wide range of topics, all presented by leading experts in their fields. We hope you find your time here both stimulating and enjoyable, as you explore the academic opportunities and the unique charm of our beautiful and inspiring city."

Welcome Notes

Modern global challenges demand an integrated, multi-perspective inquiry. This interdisciplinary module introduces students to key contemporary issues through the combined lenses of politics, philosophy, economics, and law. You will explore international relations, geopolitical shifts, and digital diplomacy through real-world case studies such as Sino-UK relations. The module investigates how economic theory informs sustainability—focusing on waste management, circular economies, and the changing nature of work—while integrating ethical frameworks to examine belief systems, well-being, and practical decision-making. Students will also evaluate modern British governance and the impact of liberal and neo-liberal ideologies on public policy. Taught by Oxford academics and researchers, you will acquire the theoretical and methodological tools needed to systematically address political, economic, and moral questions in a broader international context.

The course is for students of:

Social Sciences and, in particular, fields related to: Politics and Administration, International Relations, Philosophy, Sociology, Economics and Trade, Law, Journalism, etc.

Module Lead: Professor Michael Freeden

Prof Freeden is Emeritus Professor of Politics at the University of Oxford, a Fellow of the Academy of Social Sciences, and recipient of the Sir Isaiah Berlin Prize for Lifetime Contribution by the UK Political Studies Association.

02 | LEARNING OUTCOMES

Upon completion of this module, students will explain key concepts in politics, philosophy, economics, and law, analysing how they interact to shape global challenges. You will evaluate ethical frameworks regarding justice and governance, while integrating economic and legal theories to collaborately present evidence-based research proposals.

03 | MODULE OVERVIEW

Unit 1: International Relations and Geopolitics

- Foundational International Relations
- Sino-UK Relations Analysis
- Climate Change & News Media
- Russian Foreign Policy Evolution

Unit 2: Economics and Social Impact

- Foundational Concepts of Economics
- The British Economy: Past, Present, Future
- Hidden Human Labor Powering AI
- The Changing Nature of Work
- Social Media: Identity and Identification

Unit 3: Advanced Studies in Philosophy, Ethics, and Cognitive Theory

- Practical Ethics: Ethics in the Real World
- Happiness First: Normative Dimensions
- Artificial Intelligence: Ethics and the Future
- The Philosophy and Cognitive Science of Delusional Thinking

Unit 4: Political Science and Law

- Modern British Government
- Government Capacity to Regulate AI
- Foundational Political Philosophy
- Liberalism and Neo-Liberalism

(This syllabus is a proposed framework. The curriculum is subject to annual review and will be updated to incorporate frontier academic topics and emerging advancements in the field.)

Proposed Reading List

- Dodds, K., Kuus, M. and Sharp, J. (eds.) (2013) The Routledge Research Companion to Critical Geopolitics. London: Routledge.
- CORE Econ (2023) The Economy: Society, Power, and Public Policy. Oxford: Oxford University Press.
- Hendricks, C. (ed.) (2019) Introduction to Philosophy: Ethics. Rebus Community.
- Singer, P. (2011) Practical Ethics. 3rd edn. Cambridge: Cambridge University Press.
- Heywood, A. (2021) Political Theory: An Introduction. 5th edn. London: Red Globe Press.
- Freeden, M. (2003) Ideology: A Very Short Introduction. Oxford: Oxford University Press.

More readings and resources will be given prior to the start of the programme.

New Frontiers of Science: Math, Physics, Computer Science and Engineering (STEM) Module

01 | MODULE DESCRIPTION

How will big data drive smart city innovation? How can AI enable stable, intelligent manufacturing of personalised products? What specific applications do Newtonian mechanics and fluid dynamics have for offshore renewable energy systems? In what ways will quantum computing change our understanding of astrophysics?

"You will engage with a rigorous and intellectually stimulating programme that explores the frontiers of science, AI, engineering, and mathematics. This will be a distinctive opportunity to challenge yourself, broaden your perspectives across disciplines, and contribute meaningfully to addressing some of the most significant challenges of our time."

Welcome Notes

Modern scientific and technological breakthroughs rely on the synthesis of mathematics, physical sciences, and engineering. This interdisciplinary module explores the interplay between foundational theories, computational tools, and sustainable engineering. Students will examine advanced mathematics, physics, chemistry, and biomaterials, investigating their real-world applications in climate modelling, artificial intelligence, machine learning, and particle accelerator technology. Through case studies spanning astrophysics, offshore renewable energy, and energy system transformation, the curriculum demonstrates how interdisciplinary frameworks decode complex systems and drive technological progress. Taught by Oxford researchers and academics, this module equips students with the analytical and experimental methodologies essential for addressing global societal challenges.

The course is for students of:

Engineering related degrees, Material Science and Technology, Physics, Mathematics, Transportation, Space Science and Technology, Computer Science, Artificial Intelligence, etc.

Module Lead: Professor Martin Bureau

Professor Martin Bureau is a Lindemann Fellow and Tutor in Physics at Wadham College, as well as a Professor in Astrophysics at the University of Oxford's Department of Physics. Before joining Oxford, he was a NASA Hubble Fellow within the Department of Astronomy at Columbia University in New York City.

02 | LEARNING OUTCOMES

Upon completion of this module, students will apply advanced mathematical, computational, and AI-driven methods to model complex physical systems and interpret real-world data. You will evaluate fundamental innovations in physics, chemistry, biomaterials, and sustainable engineering, considering materials properties and environmental ethics while collaborating in multidisciplinary teams to present research-informed solutions to global technological and energy challenges.

03 | MODULE OVERVIEW

Unit 1: Advanced Mathematical Theories & Computational Applications
- Advanced Probability Theory
- Combinatorics in Problem Solving
- Mathematical Modelling: Frontiers and its Applications
- Applications in Computer Science

Unit 2: Artificial Intelligence, Robotics & Machine Learning
- AI and Machine Learning for Robotics
- Data, AI and the Future of Learning
- AI for Healthcare: Opportunities and Limitations
- Ethics, Governance, and Decision-Making in AI

Unit 3: Chemical Sciences, Biomaterials & Bioengineering
- Tissue Engineering: Building Future Medicine
- Biomaterials & Nanotechnology: Engineering at the Atomic Scale
- Biochemical Engineering: Bioprocesses and Green Chemistry
- Molecular Design: Chemistry in Medicine and Materials

Unit 4: Theoretical and Experimental Physics
- Weighing Invisible Supermassive Black Holes
- Accelerators: From the Higgs Boson to Medical Applications
- Quantum Mechanics and Modern Physical Systems

Unit 5: Sustainable Engineering Practices and Environmental Innovations
- Computational Fluid Mechanics: Offshore Energy
- Climate as a Mechanistic System
- Sustainable Energy Transport
- Shaping Future Energy Systems

(This syllabus is a proposed framework. The curriculum is subject to annual review and will be updated to incorporate frontier academic topics and emerging advancements in the field.)

Proposed Reading List

- Goodfellow, I., Bengio, Y. and Courville, A. (2016) Deep Learning. Cambridge, MA: MIT Press. (Chapters 1–5)
- Boas, M.L. (2006) Mathematical Methods in the Physical Sciences. 3rd edn. Hoboken, NJ: John Wiley & Sons. (Chapters 1–2)
- Ashby, M.F. and Jones, D.R.H. (2012) Engineering Materials 1: An Introduction to Properties, Applications and Design. 4th edn. Amsterdam: Elsevier Butterworth-Heinemann.

More readings and resources will be given prior to the start of the programme.

Business – Finance -Management (BFM) Module

01 | MODULE DESCRIPTION

How do financial systems work? How can AI-driven innovation fundamentally reshape business processes? What is the ' hidden human labor ' that powers AI? What is the true cost of unethical leadership in a global marketplace? What are the long-term strategic and social implications for the future of work and business?

"Welcome to the Business, Finance and Management module. It is a pleasure to have you join this interdisciplinary exploration of leadership, finance, technology, and sustainability. You will collaborate on real-world challenges and develop skills for responsible solutions. I look forward to seeing the insights you bring."

Welcome Notes

At the intersection of leadership, global finance, and technological innovation, this module provides a comprehensive framework for understanding contemporary business ecosystems. Structured around four key units, students will investigate organisational culture and leadership theory, the operational mechanisms of global banking, and the strategic applications of artificial intelligence in business processes. The module places equal emphasis on sustainable economics, examining how organisations integrate environmental, social, and governance (ESG) factors into long-term strategic decision-making. By linking theoretical concepts with applied case analysis, students will develop the critical management, financial, and ethical expertise necessary to evaluate dynamic business environments and drive responsible, research-informed organisational change.

The course is for students of:

Business, Economy, Finance, Accounting, Business and Public Administration, International Trade, Management, Marketing, other related fields and for students with strong interest in business matters.

Module Lead: Professor Alex Rogers

Professor Alex Rogers is Professor of Computer Science at the University of Oxford, a Tutorial Fellow at St Anne's College, and Director of the AIMS Centre for Doctoral Training. Drawing on his experience applying complexity science to business problems at BiosGroup, his research focuses on artificial intelligence, machine learning, and multi-agent systems, with expertise in market mechanism design and computational economics.

02 | LEARNING OUTCOMES

Upon completion of this module, students will explain core theories in leadership, management, global banking, and sustainability. You will evaluate how AI and emerging technologies transform business practices and ethical value creation, while collaborating in teams to present research-informed, responsible business solutions to complex global challenges.

03 | MODULE OVERVIEW

Unit 1: Leadership and Organisational Management: Theory and Practice

- Leadership: A Sporting Reflection
- Ultra Marathons: Strategic Management
- Responsible Leadership, Dynamic Strategies
- Workplace Motivation: Theory & Practice

Unit 2: Strategic Financial Management and Banking Systems

- Fintech: Examples, Uses, Benefits
- Financial Analysis and AI
- Sustainable Finance: Make Wise Decision
- Fundamental and Current Issues in Banking

Unit 3: AI and Technology: Transforming the Way we Work

- AI Driven Innovation: Shaping the Future
- Implementing AI in Business Processes
- AI for Circular Economies
- The Hidden Human Labour powering AI

Unit 4: Business and Sustainability: Transforming the World of Work

- Business and Social Impact
- Corporate Sustainability: Foundations
- Corporate Sustainability: Leadership
- Brand Management and Valuation

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Proposed Reading List

- Northouse, P.G. (2021) Leadership: Theory and Practice. 9th edn. Thousand Oaks, CA: SAGE Publications.
- Schoenmaker, D. and Schramade, W. (2019) Principles of Sustainable Finance. Oxford: Oxford University Press.
- Barberis, N. and Thaler, R. (2003) 'A Survey of Behavioral Finance', in Constantinides, G.M., Harris, M. and Stulz, R.M. (eds.) Handbook of the Economics of Finance. Amsterdam: Elsevier, pp. 1053–1128.
- Geels, F.W. (2002) 'Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case-study', Research Policy, 31(8–9), pp. 1257–1274.

More readings and resources will be given prior to the start of the programme.

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