

Shape of ACT Senior Secondary Curriculum

Health Science A/T/M

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1. PURPOSE

- **1.1** The *Shape of ACT Senior Secondary Curriculum: Health Science* will guide the writing of the ACT Board of Senior Secondary Studies (BSSS) *Health Science A/T/M* course, the new name and conceptualisation for the existing Human Biology A/T/M course.
- **1.2** This paper has been prepared following consultation with Dr Krisztina Valter-Kocsi, Associate Professor of Anatomy and Associate Director of HDR, ANU Medical School, ANU College of Health and Medicine and the deliberations of the *Health Science* course writers.
- **1.3** The paper should be read in conjunction with *The Shape of the ACT Senior Secondary Curriculum* located at: http://www.bsss.act.edu.au/curriculum/bsss_course_development_consultation

2. INTRODUCTION

2.1 The *Health Science A/T/M* course will be the basis of planning, teaching, learning and assessment in ACT senior secondary schools.

3. BACKGROUND

- **3.1** The ACT Board of Senior Secondary Studies is reviewing the *Human Biology A/T/M* course. On 31 August 2023, the Board recommended: "That the BSSS Human Biology A/T/M course be redeveloped as Health Science A/T/M". This is part of the course development cycle of improvement and renewal.
- **3.2** All courses under development are required to meet Board design specifications and to align with Board requirements for senior secondary curriculum. These specifications align with ACARA course design specifications and provide teachers with flexibility to plan, teach and assess according to the needs and interests of their students.

The BSSS *Health Science A/T/M* course will be redeveloped under the *Science Framework*, reflecting the nature of the discipline. The *Science Framework* is located at:

http://www.bsss.act.edu.au/curriculum/Frameworks/new_frameworks_in_2021

The rationale for this framework describes Science as:

The study of Science is the unveiling of the mysteries of the universe in order to make sense of nature in all its wonder and complexity. Through knowledge, observation, questioning, experimentation, discussion, critical analysis and creative thinking in a scientific context, students develop their investigative, analytical and communication skills while cultivating an appreciation of the natural world.

Scientific processes test current understandings and are continually re-evaluated. Students are challenged to examine and reconsider their understanding of scientific concepts, inquiry methods and phenomena. Students apply their knowledge of science to solve problems, make evidence-based decisions and engage in public debate about contemporary issues from a scientific perspective. The study of science explores ways in which scientists work collaboratively and individually in a range of integrated fields to increase understanding of an ever-expanding body of scientific knowledge. They examine strategies proposed to address major scientific challenges now and in the future in local, national, and global contexts.

Studying senior secondary Science provides students with a suite of cognitive and social skills and understandings that are valuable to a wide range of further study pathways and careers. Studying Science will enable students to become citizens who are more knowledgeable about the world around them and who have the critical skills to evaluate issues and make informed decisions.

3.3 All courses based on the Science Framework should enable students to develop:

- sense of wonder and curiosity about nature and an appreciation of how scientific knowledge can be used to address contemporary issues
- understanding of the theories and models used to describe, explain, and make predictions about systems, structures, and properties to provide a reliable basis for action
- understanding that scientific knowledge is developing over time, is being used in a variety of contexts; and influences, and is continuing to be influenced by, historical, social, economic, cultural, and ethical considerations and new discoveries understanding that Science is experimental and has developed through independent and collaborative research, and has significant impacts on society and implications for decision making
- ability to design and conduct a variety of field and laboratory investigations involving collection and critical analysis of data, and interpretation of evidence
- ability to critically evaluate scientific concepts, interpretations and claims in order to solve problems and generate informed, considered, and ethical conclusions
- ability to communicate scientific understanding, findings, arguments, and conclusions using appropriate representations, modes, and genres.
- 3.4 Concepts from the Science Framework (page 6) build on ACARA's F-10 Science curriculum:
 - Science inquiry skills
 - Science as human endeavour
 - Science understanding

All courses of study for the ACT Senior Secondary Certificate should enable students to develop essential capabilities for twenty-first century learners. The Australian Curriculum General Capabilities comprise an integrated and interconnected set of knowledge, skills, behaviours, and dispositions that students develop and use in their learning across the curriculum. While developing all capabilities, the *Health Science* course will engage with the capabilities of Creative and Critical Thinking, Ethical understanding, and Numeracy.

The General Capability of Critical and Creative Thinking will be developed by *Health Science* through their critical examination of theories, inquiry methodologies, data, and arguments.

In the Australian Curriculum, students develop capability in critical and creative thinking as they learn to generate and evaluate knowledge, clarify concepts and ideas, seek possibilities, consider alternatives, and solve problems. Critical and creative thinking involves students thinking broadly and deeply using skills, behaviours, and dispositions such as reason, logic, resourcefulness, imagination, and innovation in all learning areas at school and in their lives beyond school. https://www.australiancurriculum.edu.au/f-10-curriculum/generalcapabilities/critical-and-creative-thinking/

Students in *Health Science* will engage with the general capability of Personal and Social Capability in the study of human experiences at the heart of health science. They will develop an understanding of the professional conduct, ethics and empathy required in a health context.

In the Australian Curriculum, students develop personal and social capability as they learn to understand themselves and others, and manage their relationships, lives, work and learning more effectively. Personal and social capability involves students in a range of practices including recognising and regulating emotions, developing empathy for others, and understanding relationships, establishing, and building positive relationships, making responsible decisions, working effectively in teams, handling challenging situations constructively and developing leadership skills. <u>https://www.australiancurriculum.edu.au/f-10-curriculum/general-</u> capabilities/personal-and-social-capability/

Students in *Health Science* will engage with the General Capability of Ethical Understanding by engaging with significant ethical questions that determine how scientific knowledge is produced and how such knowledge is applied to improve the well-being of people.

In the Australian Curriculum, students develop ethical understanding as they identify and investigate the nature of ethical concepts, values, and character traits, and understand how reasoning can assist ethical judgement. Ethical understanding involves students building a strong personal and socially oriented ethical outlook that helps them to manage context, conflict, and uncertainty, and to develop an awareness of the influence that their values and behaviour have on others ... As students engage with the elements of Ethical Understanding in an integrated way, they learn to recognise the complexity of many ethical issues. They develop a capacity to make reasoned ethical judgements through the investigation of a range of questions drawn from varied contexts in the curriculum.

https://www.australiancurriculum.edu.au/f-10-curriculum/general-capabilities/ethicalunderstanding/

4. THE CONTEXT OF THE ACT

4.1 Courses of study for the ACT Senior Secondary Certificate:

- provide a variety of pathways, to meet different learning needs and encourage students to complete their secondary education
- enable students to develop the essential capabilities for twenty-first century learners
- empower students as active participants in their own learning
- engage students in contemporary issues relevant to their lives
- foster students' intellectual, social, and ethical development
- nurture students' well-being, and physical and spiritual development
- enable effective and respectful participation in a diverse society.

4.2 Each course of study:

- comprises an integrated and interconnected set of knowledge, skills, behaviours, and dispositions that students develop and use in their learning across the curriculum
- is based on a model of learning that integrates intended student outcomes, pedagogy, and assessment
- outlines teaching strategies which are grounded in learning principles and encompass quality teaching
- promotes intellectual quality, establish a rich learning environment, and generates relevant connections between learning and life experiences
- provides formal assessment and certification of students' achievements.
- **4.3** In consideration of the ACT context, and in response to contemporary research and literature, a Medical Science curriculum should include:
 - a student-centred pedagogical approach
 - a scientific method

- the educational needs of young people with respect to health science questions and problems
- the Science Framework and Achievement Standards
- the needs of different schools and sectors (government and non-government)
- scope for studying a range of systems of the human body and their functions and malfunctions.
- the contestability of and contingency of knowledge claims made about human health and medical treatment.

5. AIMS OF THE HEALTH SCIENCE CURRICULUM

According to the Australian Commonwealth National Skills Commission, Health Care and Social care field of employment are the fastest growing employment areas and projected to have even higher growth in coming years (Jobs and Skills Australia, 2023). Demand is particularly focused on those with Bachelor level qualifications and above, but with Certificate II and III level qualifications also in demand (Jobs and Skills Australia, 2023). Demand for registered nurses in the next ten years, for example, is expected to grow by 13.9%, and aged and disabled carers by 28%. (Jobs and Skills Australia, 2023). There has been steady growth in graduates gaining full-time employment in these areas with 78.5% of graduates in Health services and support, 82.6%, of nursing graduates, 93% or Medicine, 96.2% Pharmacy, 86.6% of Dentistry, 96.5% or rehabilitation workers in work within the three years after graduation. This is a pathway that provides a wealth of meaningful work opportunities. Yet at the same time, the OECD has charted a decline in Science and Mathematics performance by Australian school students both absolutely and against the performance of other jurisdictions (OECD, 2023). There then is a need to develop courses that encourage further participation in science and health and provide a clear pathway to careers that students find desirable and in which they are likely to find gainful employment.

Aligning with this demand, in the ACT there is strong interest among year twelve students applying to university to undertake degrees in the area of health with almost 25% of students placing a health degree as their first preference in UAC applications. This is just below the national trend of 28%. It is noteworthy that 36% of students from outside NSW/ACT applied for health-related degrees. This proportion was greater among female identifying applicants. It was also the most popular area for first preferences by non-year twelve applicants at 22% (UAC, 2023). Similarly, the ABS notes that in 2022, 23% of female identifying people were studying for a health-related qualification and about 18% of males identifying students. This makes it the second most popular degree area for females and the third most popular for males (ABS, 2022). The completion rates for these courses are also high indicating strong interest and enjoyment of this pathway (Commonwealth Department of Education, 2022). Similarly, in vocational education, health qualifications have been a popular choice across Australia with completion rates that trend upwards, but even so in health-focused qualifications, successful completion rates hover in the fifties (NCVER, 2021). Of further concern, in the ACT, the successful completion rate of healthrelated qualifications runs against the national trend and was trending downwards by 10% between 2016 and 2019, contrary to most other areas of study (NCVER, 2021). This indicates a greater need for support for students transitioning to this area of study in vocational learning. A medical and health focused course may support more successful completion rates.

In addition to workplace demand, there is also social need for people to have a good knowledge of health in their domestic and private lives. For example, the OECD has charted in Australia an increase in health spending against a background of declining population health measures such as obesity (OECD, 2023). Extending student knowledge of the body, health and medical conditions will support students in making better lifestyle choices that improve their own and their families' health.

These statistics indicate an interest by students in medical and health science courses. This shape paper draws on this evidence to propose that the course be renamed to *Health Science* to reflect student interests and pathways. This also reflects the nomenclature in tertiary institutions to reinforce that in-demand and popular pathway to medical and paramedical programs of study. All the local and nearby universities have Health faculties, while few have degrees in *Human Biology*. This will thus clarify the study pathways and leverage student interest in the area of health, medical and allied health sciences. This is a more accurate name for the area of study and thus makes pathways clearer for students.

There is only one other jurisdiction in Australia and in common international qualifications that have a *Human Biology* course similar to the ACT, and that is Western Australia. All others have Biology courses that offer some opportunities to investigate human biological topics, and also deliver some of the *Human Biology* content and concepts in a health context, such as *Human Movement* or *Exercise Science*. This updated *Health Science* course will provide ACT students with an advantage in transitioning to medical science and health degrees with the particular and focused understanding of biology that is based on the human body, as opposed to generalist biological understanding.

With platforms available for investigations such as virtual dissection, online microscopy and apps, as well as negligible risk studies of reactions, reflexes and sensation, these problems and topics can be explored empirically as well. Indeed, research suggests that some technology assisted studies result in better student understanding as they can access visualisations and conduct virtual empirical studies that would otherwise be only studied in the abstract (Lee, S.W and Tsai, C. 2013). In addition, careful use of published studies and received data sets can allow students to explore uncertainty in medicine and explore the margins of error implicit to the study of medical questions and the therapies that result. For example, Moeller and Friedman identify a range of interesting and engaging studies that students can investigate in evolutionary medicine that encompasses problem solving, evaluating studies and potential therapies, and considering the data representations and methodologies used to justify claims (Moeller, K and Friedman, M, 2018).

Associate Professor Krisztina Valter-Kocsi advises that students undertaking health science courses need more familiarity with the social aspects of health and medical questions to better engage with tertiary material and to ease the transition to tertiary study expectations. This includes engagement with bioethics, social contestation of health knowledge. These questions engage well with the Science as Human Endeavour strand of the science courses. Further, in engaging with questions of social significance of knowledge and practices, students will be usefully engaging with the chosen vocational pathway and provided with a clearer picture of the implications of their choice of pathway. Finally, as Wendy Johnson suggests is vital to science education, the media and information literacy elements of debating with and critiquing a range of online sources and media texts about health presents a practical realistic and relevant problem-solving context to build science skills, life skills and citizenship. (Johnson, W.R., 2016).

Suggestions about the existing course communicated to the OBSSS critique the organisation of the course. Comments have suggested that its topics are sequenced in ways that mitigate against student understanding. The units would be better organised by concepts particular to the discipline that aligning well with prepared materials and texts. Taking a systemic approach to the division of the courses will support access to the existing material, fuller understanding of particular systems, and multiple entry points for the course.

The *Health Science* course aims to provide students opportunities to:

- evaluate health science concepts, processes, theories, models, and the methodologies that produce them
- analyse the human body and evaluate the impact of factors that influence human health
- evaluate proposals for the management and treatment of human bodies
- conduct research to acquire data empirically and using literature and available data sets
- evaluate qualitative and quantitative data and the methodologies that produce and represent data
- evaluate the production, representation and reception of human health knowledge and practices
- evaluate ethics in health science
- develop and apply ethical science inquiry skills with a deep understanding of the scientific method in health sciences
- communicate for specific purposes and audiences, including standard scientific experimental reports
- develop study and work skills in individual and group contexts
- reflect on their own learning, study practices, and well-being.

6. STRUCTURE OF THE HEALTH SCIENCE CURRICULUM

The units are structured around the systems of the human body, and thus the key organisational concepts of the discipline. These units allow the exploration of significant questions about the nature and function of selected bodily systems and processes in *Health Science* and allows a focus on contemporary research and understanding.

Programs of Learning allow teachers and schools the flexibility to pursue current developments, students interests and contextual imperatives, while the Content Descriptions and Achievement Standards set a consistent standard. This combination provides opportunities for classwork to remain current and responsive. The Independent Study unit will allow students with interest in an area to pursue a deep investigation in that topic. This provides further flexibility to engage and extend students in their final semester of study.

In *Health Science*, students will investigate the major systems of the body and their functions. They will investigate malfunctions related to external and internal factors. They will examine the human body with the goal of understanding conditions and possible therapies for management and treatment using the latest evidence. Students will develop and understand the contested nature of human health and use their knowledge and understanding to evaluate claims in the popular media about maintaining the body and effective therapies. They will examine the ethical environment for *Health Science* and how to make ethical decisions about health. Students will apply the scientific method to develop empirically derived knowledge and understanding about health science and the human body.

Health Science provides the opportunities to inquire into fundamental questions about cells and tissues, and organisms at the microscopic level, as well as the macro systems that regulate and control the body, using scientific methodologies, including empirical and literature-based approaches. They will develop a basic and broad knowledge of the human body and medical science that will support further studies at the tertiary level. The fundamental scientific and information literacy developed will also support making informed decisions as a person and a citizen navigating a complex and constantly changing context.

This course supports students in pursuing pathways in health, medical, allied health and related fields of study and endeavor. These rapidly growing sectors provide many opportunities for meaningful employment. The knowledge and understanding developed will also support well-informed participation in personal and family life and citizenship.

UNITS

The units have been drafted for discussion as follows:

Human Reproduction and Development

In this unit, students investigate the reproductive system and its control by the endocrine system. They will explore aspects of human development and the role of genetics in this process. Students explore selected diseases and claims around the efficacy of related therapies. They evaluate bioethical matters relevant to these body systems. Students evaluate claims made in the media about health relevant to these systems.

Human Health and Performance

In this unit, students investigate cardiovascular and respiratory systems and elements of the musculo-skeletal system. They evaluate the impact of lifestyle choices, on the management and prevention of injuries and diseases pertaining to these systems. Students explore selected conditions and claims around the efficacy of related therapies. They evaluate bioethical matters relevant to these body systems. Students evaluate claims made in the media about health relevant to these systems.

Human Digestive and Urinary Systems

In this unit, students investigate the anatomy and physiology of the gastrointestinal and urinary systems, and their regulation and control by the autonomic nervous system. They evaluate the impact of nutrition on health. Students explore selected conditions, such as cirrhosis, celiac disease, gout, IBS, and claims around the efficacy of related therapies. They evaluate bioethical matters relevant to these body systems. Students evaluate claims made in the media about health relevant to these systems.

Concepts in Neuroscience

In this unit, students investigate structure and function of nervous tissue and its role in communication between the central and peripheral nervous systems. They explore the relationship between nervous tissue and ageing, degenerative conditions, mental health and drugs, including causation versus correlation in understanding environmental and genetic properties of these conditions. Students explore claims around the efficacy of related therapies, such as alternative and innovative therapies. They evaluate bioethical matters relevant to these body systems. Students evaluate claims made in the media about health relevant to these systems.

Independent Study

An Independent study unit has an important place in senior secondary courses. It is a valuable pedagogical approach that empowers students to make decisions about their own learning. An Independent study unit must be proposed by an individual student for their own study and negotiated with their teacher. An independent study unit requires the principal's written approval. The program of learning for an independent study unit must meet all the content descriptions as appears in the course. Independent study units are only available to individual students in Year 12. Pre-requisites for an Independent study unit are that students have completed at least THREE standard 1.0 units from this course.

7. CONSIDERATIONS

7.1 Incorporating a futures orientation

Teachers use the course document to inform the redevelopment of Programs of Learning that engage with new discoveries and research in their discipline. Further, the emphasis on scientific literacy, understanding the scientific method and interrogating public representations of health science will empower students as lifelong learners to engage critically with new information and new writing in health science. In understanding the nature of health and the human body, they are equipped to grow and function in society.

The course meets objectives outlined in *The ACT Future of Education Strategy* aim to allows students agency in being "active participants in their learning" by developing students "interests, knowledge and skills". *Health Science* provides opportunities for teachers and students to develop their interests in this area and through Programs of Learning and independent studies components develop courses particular to contexts and interests. Further, students will develop inquiries into areas of particular interest and develop a "high standard of literacy and numeracy" in critically analysing, representing, and communicating their findings. (ACT Government, Future of Education Strategy Website, 2018). Further, Health Science as a body of knowledge contributes to students developing a better understanding of themselves and others and growing to be "mature and resilient adults" (Berry, Y, 2018).

The course also meets objectives outlined in the *Alice Springs Mparntwe Declaration* has as a goal "All young Australians become confident and creative individuals, successful lifelong learners, and active and informed members of the community." (2019, p. 5) With a critical and scientific understanding of people and human behaviour, students of *Health Science* will be well-equipped "for their potential life roles as friends, family, community and workforce members" and able to "embrace opportunities, make informed decisions about their own lives and accept responsibility for their own actions." (p. 5). Further, as life-long learners equipped with a scientific education, they will be well able to meet Mparntwe's goals that students be "inquisitive and experimental and have the ability to test different sources and types of knowledge" (p. 5). By inquiring into *Health*

Science's methods and observing and understanding others, they will have experience in acting with "moral and ethical integrity" and "have empathy for circumstances of others". (p. 5).

The *Health Science* course offers opportunities for students to understand themselves and others while developing scientific, ethical, personal, and social capability, numeracy and literacy skills that will be invaluable to life and further education. This will empower students to be active participants in their communities and wider society.

7.2 Health Science curriculum

The *Health Science* curriculum retains Human Biology's important place in ACT senior secondary curriculum. The curriculum fosters higher order thinking, scientific inquiry, and communication skills. Students will become more critical and literate consumers of health information in the general media and creators of their own well-informed content. They will better understand the nature of people and society and themselves.

7.3 Equity and opportunity

The *Health Science* course provides flexibility and choice for teachers and students. The factors that influence this choice include school and community contexts, local community learning opportunities, contemporary and local issues, and available learning resources.

The *Health Science* course provides opportunities for students to develop an understanding of aspects of Australia's Aboriginal and Torres Strait Islander peoples in public health contexts. They offer the opportunity to view the individual and society from a range of perspectives, including indigenous, gender, and neurodiversity, and their experience of health and medical system.

7.4 Connections to other learning areas

Health Science is a science course with connections to other Sciences, the Social Sciences and Health, Physical and Outdoor Education courses. The learning acquired by students in *Health Science* contributes to learning in other areas such as *Biology, Chemistry, Philosophy, Sociology,* and Health, Physical and Outdoor Education courses. The course will identify where there are links or opportunities to build cross curriculum learning. The connections are implicit to the *Health Science* curriculum.

7.5 Role of digital technologies

Students and teachers integrate a growing range of online information, tools and applications of diverse origins and perspectives. These include digitised online materials such as research papers, data sets, case studies and popular health science media, as well as other online resources including databases, reference works and indexes to library holdings.

Further, digital platforms, such as social media, are also a factor influencing people and behaviour and a rich area of study in of itself.

7.6 Clarity of curriculum

The curriculum is substantial and flexible. It is sufficiently rich and descriptive to guide teachers with limited experience but avoids excessive prescription that would hamper experienced teachers from exercising their skills. The curriculum document is expressed clearly in terms that are accessible to a new teacher, who is well-educated in their discipline and in pedagogy, while allowing all teachers to enhance it with their interests and expertise.

7.7 Breadth and depth of study

Content descriptions specify the knowledge, understanding and skills that students are expected to learn and that teachers are expected to teach. Teachers are required to develop a program of learning that allows students to demonstrate all the content descriptions.

A Program of Learning is what a college provides to implement the course for a subject meeting students' needs and interests. It is at the discretion of the teacher to emphasis some content

descriptions over others. The teacher may teach additional (not listed) content if it meets the specific unit goals providing that it does not duplicate content in other units.

7.8 The nature of the learner

The courses address the needs of diverse learners and cater for Tertiary (T), Accredited (A) and Modified (M) levels of study. This provides a pathway for students intending various tertiary and vocational post-school studies and to a health life.

7.9 General capabilities

Skills and understanding related all ACARA General Capabilities are developed and used in *Health Science*. These will be expressed through the Content Descriptions, Achievement Standards and Programs of Learning.

7.10 Cross Curriculum Perspectives

Each of these perspectives, Indigenous education, sustainability, and Australia's links with Asia, are represented in the courses in ways appropriate to that area. Curriculum documents are explicit as to how the perspectives are dealt with in each course and how links can be made between learning areas. There are rich opportunities to incorporate Indigenous perspectives into the *Health Science* course. Students will consider the medical aspects of sustainability, such as the impact of pollution, environmental degradation and disaster on human health. Further, in considering the social context of health, the social habits, judgements and norms, students will consider cultural variations in health issues such as those found across Asia and Australia.

8. PEDAGOGY AND ASSESSMENT

The underpinning beliefs and learning principles for the development of ACT Board of Senior Secondary School curriculum as are follows:

8.1 Underpinning beliefs

- All students are able to learn
- Learning is a partnership between students and teachers
- Teachers are responsible for advancing student learning.



8.2 Learning Principles

- Learning builds on existing knowledge, understandings, and skills. (Prior knowledge)
- 2. When learning is organised around major concepts, principles, and significant real-world issues, within and across disciplines, it helps students make connections and build knowledge structures.

(Deep knowledge and connectedness)

- Learning is facilitated when students actively monitor their own learning and consciously develop ways of organising and applying knowledge within and across contexts. (Metacognition)
- Learners' sense of self and motivation to learn affects learning. (Self-concept)
- Learning needs to take place in a context of high expectations. (High expectations)
- Learners learn in different ways and at different rates. (Individual differences)
- 7. Different cultural environments, including the use of language, shape learners' understandings and the way they learn.
 (Socio-cultural effects)
- 8. Learning is a social and collaborative function as well as an individual one. (Collaborative learning)
- 9. Learning is strengthened when learning outcomes and criteria for judging learning are made explicit and when students receive frequent feedback on their progress. *(Explicit expectations and feedback).*

9. CONCLUSION

The *Health Science A/T/M* course is to be developed to supersede the Human Biology course with a name the more readily recognises the interests and pathways of students that select it. The study of *Health Science* promotes critical and creative thinking, ethical understanding, and personal and social capability to equip young citizens for the demands and challenges of a world in which scientific claims are used to justify significant national and international decisions. The *Health Science* course equips students to access rapidly growing and in-demand training, further education and employment in the health sector.

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