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EXTRACTS FROM
THE UPPER SECONDARY SCHOOL CURRICULUM
PART 2

COMMON CORE SUBJECTS

GENERAL AREA OF STUDY

THE NATIONAL COUNCIL FOR
UPPER SECONDARY EDUCATION
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(This booklet contains only extracts from the upper secondary school curriculum part 2, and the numbers of the paragraphs refer to the Norwegian original.)

RELIGIOUS INSTRUCTION (0 - 2(1) - 1(2))

1 GENERAL INFORMATION

Religious instruction is a common core subject in the general area of study, 2-year foundation course and advanced course II. Pupils may be exempted from this subject under the conditions stated in the Act concerning Upper Secondary Education, §5, final section.

2 AIMS

Pupils should:

- increase their knowledge of, and insight into, religious life in the world today

- acquire a deeper understanding of Christianity
- acquaint themselves with the confessional principles of Christianity

- develop their understanding of and respect for religious and ethical values
- study current approaches to moral and philosophical problems
- discuss and increase their understanding of their own fundamental moral problems
- feel encouraged to take an active and lasting interest in questions of existence and social life.

3 SYLLABUS TOPICS

3.1 The presentation of religions, confessions, ideologies and philosophies must be such that their adherents would find it acceptable. However, the presentation must not be so neutral as to omit controversial topics or to prevent the expression of divergent views.

3.2 List of topics

Living religions

- general knowledge of religious life
- the various religions

Christianity

- The Bible
- fundamentals of Christianity
- knowledge of the thinking behind confession

Ethics and philosophy

- important philosophies and sets of values in our society
- ethical concepts and fundamentals
- ethical problem areas

5 ASSESSMENT

A grade for overall achievement will be given at the end of each year. Grades may be based on tests, with particular emphasis on:

a) factual knowledge

b) ability to focus on important information and relationships

c) independent critical attitude and personal judgement

N O R W E G I A N (4 - 5 - 5)

1 GENERAL INFORMATION

Norwegian is a common core subject in the general area of study and in the 2-year foundation courses. Students have four periods a week in the first year and five in the second and third years.

2 AIMS

2.1 Pupils should:

- acquire knowledge of the Norwegian language and practise correct and precise expression both in speech and writing
- follow the development of the Norwegian language and current language problems
- through exploration into different forms of literature gain the reading experience necessary for deeper understanding of literature and a greater interest in reading.
- acquire knowledge of Norwegian literature, with particular emphasis on its most important epochs
- acquaint themselves with the languages and literatures of Sweden and Denmark, and read a selection of world literature
- acquire a certain knowledge of literary style
- gain experience in using books, newspapers and other mass media critically as sources of information.

Equal emphasis should be placed on the linguistic and literary parts of the subject, while the work should be so organised as to enable the pupils to see the subject as a whole.

3.2 List of topics

Each of the three years is a self-contained unit. However, planning should aim at natural progression over two or three years.

Topics have for practical reasons been organised into two groups: language and literature. In teaching, the two should as far as possible be merged into a whole.

The language study consists of:
- systematic instruction in the use of spoken and written Norwegian. Points where the two overlap should be exploited.

- teaching of linguistics, which should focus on the most important fields of grammar and style, as well as current language problems.

- study of the history of the Norwegian language, with an introduction to Old Norse and modern Norwegian dialects, as well as to the other Scandinavian languages.

The literature study consists of:

- study of a selection of Norwegian literature and a smaller selection of Swedish and Danish literature, as well as a small selection of foreign literature in translation.

- introduction to the elements of literary theory

- introduction to central aspects of the history of Norwegian literature as seen in relation both to Scandinavian and world literature.

Some topics are core material which most pupils should study, while other topics can be dealt with as the need arises. The point of departure for the pupils' study must be the stage which the individual pupil has reached, as well as the level of language skill reached by the class as a whole. The selection of material for study should also to some extent depend on the pupils' preferences.

Since topics will receive attention compatible with the pupils' preferences and capacity for learning, as well as the amount of skill and knowledge they have acquired in the basic school, both the topic lists and the number of pages to be read in this connection must be considered as general guidelines which should not be interpreted too literally.

5 ASSESSMENT

At the end of each year pupils receive a grade for overall achievement; after the first year, grades are given for both written and oral work. The grade for written Norwegian is given for achievement in both official languages of Norway, with the main emphasis on the language which is the pupil's mother tongue.

Evaluation should consider how far the pupils can express themselves easily and correctly in speech and writing, the extent of their vocabulary, and their factual knowledge in the areas of Norwegian language and literature. These two subject areas are considered as equally important. Moreover, extra work done by the pupil, such as lectures or written reports, should be duly considered.

F O R E I G N L A N G U A G E S

1 GENERAL INFORMATION

1.1 Survey of language courses at different levels

The following terms will be used for language subjects at different levels:

A-language is English

B-language is the language which pupils have studied in addition to English in the basic school, and which they also study in the upper secondary school.

C-language is a language which the pupils only study in the upper secondary school.

The foundation courses in C-language are two-year beginners' courses which can be followed in any language in which the school offers tuition.

Foundation courses in A- and B-languages are based on at least two years of study in the basic school.

1.2 Foundation courses in modern languages

	Periods per week		
	1st year	2nd year	3rd year
Foundation course in A-language	4	3	
Foundation course in B-language	4	3	
Foundation course in C-language	4	3	
Foundation course in C-language		5	5

Pupils who intend to study two foreign languages, but who have either studied only English in the basic school, or who do not wish to take courses in their B-language, have to take a foundation course in a C-language of 4 and 3-periods in the 1st and 2nd years in the general ara of study. This foundation course is considered as a compulsory subject. (In a 2-year foundation course, pupils may take a 4-period course in B- or C-language in the second year.)

2 AIMS

Pupils should:

- develop their ability to understand the foreign language in speech and writing

- develop their ability to use the language in speech and writing

- broaden their knowledge of social and cultural conditions in the language area in question

- acquire through the chosen language a basis both for further learning and orientation and for personal development.

This general goal applies to all courses in modern languages in the upper secondary school and it is also the basis for the specific goals of the individual courses.

Foundation course the in C-language (beginners' level)

At the end of the foundation course in the C-language - after two years of study - the pupils should be able, within the confines of the material studied, to

- understand simple everyday speech
- make themselves understood orally, with good pronunciation, in simple contexts
- read and understand simple texts
- use the language orally and in writing in simple letters, messages, compositions, etc.
- have some knowledge of everyday life in the language area in question.

Foundation courses in A- and B-languages

At the end of these courses, pupils should, within the confines of the material studied, be able to:

- understand everyday speech on general topics
- use the language, with good pronunciation, on topics from everyday life
- read and understand texts suited to their year of study
- use the language in freer expositions such as letters, summaries and compositions on everyday and general topics
- have some knowledge of everyday life and social conditions in the language area in question.

2.1 Comments on aims

The aims for language study are here amplified for two levels:

- foundation course in C-language (beginners' course)
- foundation course in A- and B-languages.

This amplification of the study goals is intended as a guidance for what can be expected at the different levels of education. When assessing the requirements for the different languages and courses, it has to be borne in mind that English is taught for more years in the basic school than is a B-language. It has further to be borne in mind that the teaching of Russian, for instance, will require extra time as a new alphabet has to be learnt.

Language education aims at being of practical use to the pupils themselves and for their careers. Considerable emphasis should therefore be placed on developing the pupils' ability to use the language.

3.2 List of topics for the courses

Foundation courses in C-language require the following materials:

- texts containing both dialogue (everyday language) and factual material. As far as possible, the vocabulary of the texts should be based on word frequency lists. The texts must be of high quality as regards both language and content.

- workbooks or practice material containing a broad selection of systematic exercises, oral and written. Parts of the practice material should, as far as possible, be self-instructional.

- a systematic grammar (e.g. in the form of a separate booklet) to support pupils in their independent work with the material.

- vocabulary lists. In teaching material written for the purpose, the vocabulary lists should be bilingual where necessary.

- tape recordings of a broad selection of texts (including dialogues) for listening practice and oral exercises. The tapes should be recorded by native speakers.

- visual material in the form of illustrations, overhead projector transparencies, etc.

- a teacher's guide.

Manuals for beginners' courses should contain enough material for about two years of teaching. The content should be suited to the age and interests of the pupils.

Foundation courses in A- and B-languages

Material for these courses should be obtained from various sources:

- anthologies containing vocabulary lists, with a possible supplement of workbooks and teachers' guides

- systematic language practice courses, or a grammar with practice booklets

- literature (with necessary adaptations), preferably supplied with vocabulary lists

- special booklets of material related to the subject

- material from school radio and television

- additional material such as thematic booklets, material from newspapers, journals, periodicals for young people, reading labs or other self-instructional material

- recorded material with or without texts, e.g. literature and special exercise material for listening comprehension

- filmstrips, overhead projector transparencies, films and television programmes

- dictionaries, encyclopaedias, books on English and American background, etc.

- practice booklets

Extent of material for the different language subjects

For the relationship between intensive and extensive reading material: see §3.3.

ENGLISH

(Foundation course in A-language)

The pupils should read a total of about 300 pages over two years.

Pupils who take courses in English business correspondence will read in addition some 200 pages over two years.

The material should include both literary and factual prose, of which up to one half, intensive and extensive, may be specialised, e.g. job related.

FRENCH, SPANISH AND ITALIAN

These three languages are considered under one heading, as there is very little difference between them as regards the scope of relevant material.

Foundation course in C-language (beginners' level)

The foundation course of 3 and 4 periods in the 1st and 2nd years aims at developing an active vocabulary of between 1100 and 1500 words.

The foundation course of 5 and 5 periods in the 2nd and 3rd years aims at developing an active vocabulary of between 1200 and 1700 words.

In the 5+5 period course the pupils should be able to read about 30-40 pages of texts in addition to the beginners' books.

Foundation course in B-language

Pupils should read a total of 100 pages over two years, both literary and factual prose. The latter should constitute minimum one-third, maximum one-half of the total amount. Some of the factual texts should deal with everyday life, and with cultural and social conditions in the relevant countries. The literary texts should include both prose and poetry, mainly from the 20th century. Pupils in the 2-year foundation course with four weekly periods should read 50 pages.

GERMAN

Foundation course in C-language (beginners' level)

The foundation course based on 4 and 3 periods in the 1st and 2nd years aims at developing an active vocabulary of ca. 1200 - 1700 words.

The foundation course of 5 and 5 periods in the 2nd and 3rd years aims at developing an active vocabulary of ca. 1500 - 2000 words.

Pupils who take the more comprehensive course should be able to read some 40-50 pages of texts in addition to the beginners' books.

Foundation course in B-language

Pupils should read a total of about 150 pages over the two years. (In the two-year foundation course with four periods per week, approximately 75 pages should be read.)

Both literary and factual texts should be included, with the latter constituting minimum one-third, maximum one-half of the total amount. The literary texts should include both prose and poetry. The pupils should read texts from the whole of the German-speaking area.

RUSSIAN, FINNISH AND LAPPISH

See part 3 of the upper secondary school curriculum.

3.3 Comments on the material

Wherever the extent of the material for study is indicated as a specified number of pages, this is intended as a general requirement which most groups or classes would be able to meet, but which should not be practised too strictly.

At least a quarter of the total number of pages should be read intensively. Time spent on audio-visual programmes can be converted into a reduction in the number of pages read extensively. Factual texts should constitute at least one third of the whole material.

5 ASSESSMENT

At the end of each year pupils receive a grade for overall achievement, both written and oral. Evaluation should to some extent be based on emphasis given to various language skills, viz.:

- Ability to comprehend the spoken language ca. 20 %
- Ability to speak the language ca. 30 %
- Ability to read and understand texts ca. 20 %
- Ability to express oneself in writing ca. 30 %

In foundation courses in A- and B-languages, a certain emphasis must be placed on factual knowledge of the content of the relevant texts. This will mostly be a question of background knowledge. However, memory should not be of decisive importance to the evaluation of the pupils' achievement.

Pupils with speech or reading problems should be allowed to make up for their deficiency by increased emphasis on other skills.

SOCIAL STUDIES

1 GENERAL INFORMATION

The term social studies covers the subjects of geography, social science and history. Together they consitute a common core subject in the general area of study, with 3-3-5 or 0-6-5 periods per week. Special courses in social science and history have been designed for the Social Studies Branch.

In their first year the pupils study physical and human geography, with the main emphasis on the latter. In their second and third years they study social science and history.

2 AIMS

The pupils shall:

- acquire knowledge of the geographical environment of man, both in Norway and the world as a whole, as well as understanding of the interaction between nature and society.

- acquire knowledge of human life in different periods of our history, as well as social conditions and cultures of our own time, their origins and development

- acquaint themselves with the economic, social and political conditions of modern Norway

- develop a critical and responsible attitude to social questions; learn to respect the society and culture of their own country as well as those of other countries, both in the past and the present; learn to tolerate different ways of thought

- gain insight into approaches and methods typical of the relevant subjects

- gain experience in rational, analytic and independent treatment of facts and opinions bearing on social conditions.

3 SYLLABUS TOPICS

3.1 How these aims affect the selection of material

In the subject area of social studies it cannot be assumed that pupils start from a common platform of knowledge. The syllabus must therefore be given an independent frame of reference. As there will naturally be a certain amount of overlapping between the subjects of geography, history and social science, they should as far as possible be seen in relation to each other.

It must be emphasised that the lists of topics for all three subjects are only meant as frames of reference. To cover all topics in the teaching of the individual class would hardly be possible.

3.2 List of topics

3.2.1 Geography

Practical use of

- atlas
- topographical maps
- landscape photographs
- statistical tables
- diagrams
- cartograms

PHYSICAL GEOGRAPHY

A Map study

- A survey of the shape and size of the Earth
- Geographical coordinates; points of the compass
- Scales
- Pictures of the Earth's surface
- Maps of Norway

B Geology

- General introduction to the earth's internal structure, composition of the earth's crust, age of rocks
- Geology of the local district, age, formation, effect on land forms, vegetation and settlement
- Knowledge of a selection of rocks and minerals from the area in question

C Physical environments

- Survey of the earth's topography
- Land forms in Norway, their formation, important landscape types
- Soils in Norway
- Vegetation in Norway

D Water

- Survey of the water cycle
- Precipitation, snow and avalanches, glaciers
- Ground water
- Water in rivers, lakes, fjords and oceans

HUMAN GEOGRAPHY

A Population

The following topics should be studied in a Norwegian or Scandinavian context, but also in a global context where this is natural:

- Population - its growth and structure
- Structure of industries
- Settlement patterns - urbanisation
- Migrations

B Resources and industries

1 Agriculture in Norway

Physical conditions, geo-agricultural regions, organisational units and property ownership, agricultural methods, yields, economy and co-operation

2 Forestry in Norway and Scandinavia

Distribution of forests in Scandinavia, growth and felling, property ownership, methods

3 Norwegian fisheries

Coastal fishing, seasonal fishing, deep sea fishing, structural changes, processing, marketing, co-operative enterprises

4 World resources

- Simple climatic survey, vegetation zones, physical conditions

- Level of organic resources
- Mineral resources
- Energy resources

The following points (5 and 6) should be treated in a Norwegian or Scandinavian context and in some cases, where this is natural, in a global context.

5 Industry and energy

- Norwegian energy problems
- Raw materials
- Localisation
- Development and structure
- Important branches of industry

6 Service industries

- Barter economies - market places - money economies
- Commodity trade in Norway
- Transport in Norway

- Other service industries

- Foreign trade - world trade. Structure and conditions, balance of payments, exports and imports

- The merchant fleet, its structure, area of operation and economic importance

- Development tendencies, concentration - decentralisation

C Land use and environmental protection

- Environmental values and resources
- From physical landscape to human landscape
- Air and water pollution, dumping
- Administration, physical and environmental protection, land use

D Developing countries and industrialised countries

- Characteristics of industrialised countries
- Economy and culture of developing countries
- The question of distribution

3.2.3 List of topics for social science

OBLIGATORY TOPICS

1 The family and the community

- The family's tasks and problems
- Processes of socialisation
- Problems of sex roles

2 Politics

A The political system

- What is politics?
- Constitutions, state power and human rights
- Different political systems

B Participation in political life

- Election systems and representation
- Behaviour of the electorate
- Functions of parties, party systems
- Organisations in industrial and working life, wage negotiations, central and local authorities
- Other organisations and pressure groups

C Political institutions and administrative agencies

- Parliament, the government, public administration, municipal and regional councils

- Recruitment, organisation, functions and interaction of the agencies

D Decision-making processes

- Public authorities and other bodies
- The Act concerning administration, the civil ombudsman, social security rights

E Distribution of benefits and burdens

- Income policy, tax policy, social policy
- Education

3 Law and order

- Composition and procedure of the courts
- Standards and rules of law, power of the courts
- Civil law: family law, contracts, compensation and responsibility, civil disputes

4 Economics

- Production and consumption, goods and services
- Important collective ideas, national budget and national economy
- Money and means of payment
- Prices and incomes
- Employment and economic cycles
- Foreign economic policy and exchange rates
- Economic policy, politico-economic systems

OPTIONAL TOPICS

5 Crime

- Deviationists
- Frequency of crimes - social groups - juvenile crime
- Punishment, basis for punishment

6 Working life

- Labour contracts and industrial democracy, industrial environment
- Property and power
- The social responsibilities of industry
- The structure of the labour market. Mobility

7 Social policy

- Main principles of our social policy
- National insurance laws
- Social service laws
- Study of a social problem
- Consequences of drug addiction on the individual and the community

8 Mass media and the formation of opinions

- Communication in private and public life
- The nature, duties and functions of mass media

9 International politics

A International society

- The sovereign state
- Sovereignty and supranational agencies
- Sovereignty and the international economy
- Alignment and collective security
- The international system and small states
- Rich and poor states
- The concepts of nationhood and nationalism
- International law

B Attitude of the State

- Foreign policy goals, capacity and intention
- Ideology and foreign policy
- Arms control and the arms race - peace movements

C Norwegian foreign policy

- Norwegian security policy
- Functions of the defense forces
- Norway and international co-operation
- Norway and developing countries

3.2.2 The study of history

Allocation of teaching periods

In the second year three periods per week are allocated to the study of history up to about 1850. The history of the Scandinavian countries should be studied as one continuous process, whereas the study of world history offers three alternatives.

In the third year three periods per week are allocated to the study of history after 1850., with opportunities for coherent presentation as well as for a certain amount of in-depth study. However, individual groups or pupils should still be allowed to focus on certain topics while dealing more cursorily with others.

The whole of the history of Scandinavia is compulsory, and should be presented as a continuous process through the centuries, with the main emphasis on the history of Norway, but with necessary excursions into the histories of Sweden and Denmark.

5 ASSESSMENT - SOCIAL STUDIES

Pupils receive a grade for overall achievement in each of the three subjects, Social Studies I, II and III. Pupils who take the one-year course in Social Studies I and II receive a grade for each of these two subjects.

Independent work and co-operation should be taken into account. Considerable emphasis should be placed on knowledge which demonstrates all-round understanding and insight, and the ability to give a systematic and coherent presentation. Knowledge of detail without relevance to context or argument is less important.

M A T H E M A T I C S

1 GENERAL INFORMATION

Teaching of mathematics in the upper secondary school should proceed from the foundations which the pupils have established in the basic school.

1.1 The various courses in the general area of study

1ST YEAR

5-period course (IMA). This is an obligatory course.

2ND YEAR

5-period course for pupils in the natural science branch (2MN)

This is an obligatory course for the natural science branch, primarily designed for pupils who will continue their study of mathematics. However, emphasis is also given to topics which may be usefully applied in physics, chemistry and biology.

5-period course for pupils following the social studies branch (2MS). This course is primarily designed for the social studies branch in the 2nd year. The course can also be organised with two periods in the 2nd year and three periods in the third year.

3RD YEAR

5-period course for pupils following the natural science branch (3MN). The course is a continuation of the 2MN course.

5-period course for pupils following the social studies branch (3MS). The course is a continuation of the 2MS course.

OPTIONAL SUBJECT IN 2ND OR 3RD YEAR

A 2-period course in special mathematical topics such as data processing, differential equations, mathematical logic, descriptive geometry, probability calculus, progressions, complex numbers,matrices and determinants, history of mathematics, theory of conic sections, theory of relativity and mathematics for economists.

1.2 Connections between courses

The syllabus requires that 5-period courses be available in all three years of the general area of study in the upper secondary school. Pupils may complete their study of the subject after the 1st, 2nd or 3rd year. For pupils who read mathematics over more than one year, conditions should be established for the best possible continuity in the teaching over two or three years.

The 5-period course in the 1st year (1MA) is divided into core material and optional material. Optional material related to vocational courses or particular advanced courses in mathematics may receive increasing emphasis as pupils' career plans take a more definite shape.

2 AIMS

Pupils shall acquire

- the knowledge and skills necessary for their chosen education and the demands of modern society
- a good knowledge of fundamental themes and concepts in the subject
- understanding of mathematical approaches and techniques
- understanding of the importance of mathematics in the development of science and technology
- the best possible foundation for further independent study in the subject.

Comment on the aims

Mathematics is studied both as a tool and as a subject in its own right. The overall goal for the teaching of mathematics must therefore be to demonstrate its application in other subject areas, as well as to experience the pleasure of exploring this subject.

The teaching of mathematics should also lay the foundation for further studies both in this and related subjects.

3.2 Syllabus topics for the 5-period course (1MA) in 1st year

The course assumes knowledge of the mathematics taught in the 9th grade of the basic school.

A CORE MATERIAL

1 Arithmetic and algebra

Calculation with fractions. Complex fractions
Calculation with polynomials. Factorising of polynomials
Simplification of rational functions
First-order and second-order equations

Solution sets

First-order equations with two unknowns
Construction of equations
Inequalities of the first and second order
Exponentials in which the exponents are integer numbers.

Numbers written in standard notation

An introduction to rational, irrational and real numbers.

Intervals

Square roots. The axioms $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$ and $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

Simple and irrational equations

2. Functions

The concept of a function
Empirical and algebraic functions
Open statements which a) define functions, b) do not define functions

Definition sets and value sets

Ordered pairs of numbers. Co-ordinate system

The graph of functions and relations (The graph of equations and inequalities)

Functions represented by the equations $y = ax + b$ and

$$y = \frac{ax + b}{cx + d}$$

Horizontal and vertical asymptotes

Quadratic equations, factorials, maximum and minimum
Solution of equations, sets of equations and inequalities by means of graphs

Proportionality and inverse proportionality

Concepts from logic and set theory should be used in the presentation of this material whenever they appear to be naturally applicable.

B OPTIONAL TOPICS

1 All branches

For pupils who need no more than core mathematics, emphasis should be given to the use of this material in a relevant and practical way. Where pupils from different branches and areas of study are taught in the same class, material should be chosen in such a way that all pupils get some material which suits their needs and interests.

2 General area of study

Pupils who wish to continue the 2MN course or the 2MS course should select optional material from the following areas:

Necessary tools from logic and set theory (No examination in this material will be required)

An introduction to the application of proofs and various types of proofs, counter-positive proofs, "ad absurdum" proofs.

Absolute values. Elementary equations, inequalities and functions with absolute values
Examples of graphs of first-order equations with two unknowns.

Elementary first-order equations with three unknowns

Division of polynomials. Zero points of a polynomial. Factorising in linear factors

Quadratic equations with one parameter (Examination of the sum and product of the roots will not be required)

Numbers written as exponentials with base 10. An introduction to the derivative. Trigonometry (only for those who choose 2MN).

Vector algebra (only for 2MN)

5 ASSESSMENT

Pupils are given a grade for overall achievement at the end of the course. The grade must be based on both the core material and the pupil's optional material.

Throughout the school year, the pupil's ability to handle the subject material orally and in writing should be evaluated. Tests will assess the pupil's ability to work independently, and should be designed as a natural part of the instruction.

N A T U R A L S C I E N C E

1 GENERAL INFORMATION

Natural science, which is a common core subject in the general area of study, is an introduction to natural science subjects in the upper secondary school. For pupils who do not choose natural science in the 2nd and 3rd years, the course provides a general outline of this subject area.

The course includes topics form biology, physics and chemistry in the suggested ratio of 2-1-2, so the course has 5 teaching periods a week.

2 AIMS

The pupils should:

- receive an introduction to natural science, regardless of whether they choose branch subjects or optional subjects within this subject area
- acquire insight into the methods of the natural sciences, stimulate their interest in scientific phenomena, and lay the foundation for subsequent choices within this subject area
- gain perspective through study of trends in scientific thought in the past and present, and also of trends pointing towards the future in areas where modern research is particularly active
- develop their power of observation, and improve their understanding of the interdependence between various factors in nature.

The biology section of the natural sciences should:

- provide deeper knowledge of the manifestations of life, as well as their physical and chemical foundations
- give an introduction to genetics
- attempt to further understanding of the dependence of organisms on each other and on non-biological factors
- develop a feeling of dependence on - and responsibility for - nature and all life
- develop the pupils' understanding of the possible harmful effects of encroachment upon nature and the necessity of protecting the natural environment.

The physics section of the natural sciences should:

- provide knowledge of important concepts and quantities in the subject of physics

- introduce basic model concepts, laws and theories

- demonstrate the position of physics among the natural sciences, and its importance as a tool for other natural sciences.

The chemistry section of the natural sciences should:

- provide knowledge of laws and theories of chemistry

- give an introduction to our concept of the structure of matter

- provide knowledge of some important types of reaction

- provide a survey of the most important areas of chemistry and demonstrate its importance as a supporting subject in other areas of natural sciences.

3.2 List of topics

Physics topics

Mechanics

- basic concepts: length, time, mass
- linear movement: speed, acceleration, force, work, energy, effect

Thermophysics

- aggregate states
- inner energy
- temperature
- heat

Electricity

- electrical charge
- electric field
- electric current
- electrical energy and effect

Chemistry topics

Atomic chemistry
- electrons, protons, neutrons
- atomic mass and introduction to the unit "u"
- the elements
- isotopes
- electronic structure of first 20 elements
- periodic table of the elements and brief outline of their periodic properties
- emission and absorption of light

Ions and molecules

- ionic bonding
- covalent bonding
- octet rule
- bond polarity
- salts
- molecular mass, formula mass
- water as a solvent

Gases

-Avogadro's law

Oxidation and Reduction
- basic definitions
- simple examples of oxidation and reduction
- electrolysis (eg $CuCl_2$ HCl)

Acids and bases

- definitions
- neutralisation
- pH scale
- indicators

Thermochemistry

- exothermic reactions
- endothermic reactions

Inorganic chemistry

- non-metals, a brief description of the more important non-metals
- metals, a brief description of the more important metals

Organic chemistry

- hydrocarbons
- alcohols
- carboxylic acids
- esters
- carbohydrates
- amino acids
- proteins

Biology topics

The cell

- cell structure
- cell functions

Some physiological topics and their anatomical background
- photosynthesis
- cell respiration

Heredity/Genetics

- cell division (mitosis,meiosis)
- heredity (genes)
  genotype,phenotype
  homozygoty, heterozygoty

- laws of heredity (Mendel)
  monohybrid inheritance (dominant, recessive, and intermediate genes)
  dihybrid inheritance

- mutations
- sex determinants

Ecology

Terms

- ecological system
- producers
- consumers
- decomposers

Energy and metabolism in nature

- carbon cycle
- nitrogen cycle
- water cycle
- nutrition - chains and networks
- nutrition pyramid

Ecological system

One ecological system should be covered - sea water, fresh water or land

Man and his environment

- man's dependence on nature
- encroachment on nature
- pollution
- population explosion
- reproduction
- contraception
- environmental education

Exercises : At least 20 exercises, each corresponding to one period's work

5 ASSESSMENT

The pupils receive a grade for overall achievement at the end of the course. Factual knowledge, active participation and practical skill should be taken into consideration, as well as written reports and other work that may be submitted for evaluation.

Written tests should be so designed that the pupils' under-standing and grasp of the subject are tested, as well as their factual knowledge. The same principle should apply to examinations.

Written reports of practical work must be submitted at the oral examination, as a basis for questions by the examiner. Written reports from additional projects may also be submitted.

P H Y S I C A L E D U C A T I O N

1 GENERAL INFORMATION

The syllabus applies to physical education as a common core subject, but it may also apply to both optional subjects.

Teaching periods are allocated to each of the three years as follows:

	1st year	2nd year	3rd year
General area of study	3	2	3
Optional subject I	2	2	2
Optional subject II	2	3	5

Each one-year course is a self-contained unit which may, however, be combined with - or followed by - additional courses within the same subject area.

3.2 Syllabus topics

Topics should be taken from the following main areas:

1 Physical training
2 Mobility and techniques of physical work
3 Anatomy and physiology
4 Health
5 Open air activities, safety rules, protection of the environment, ecology
6 Sports and games
7 Creative activity

The goals of the teaching should primarily be sought through physical activity, and teaching material intended to clarify the syllabus topics should be adapted for this purpose.

Suggested topics

Physical training

Exercises intended to achieve and exploit maximum oxygen intake
Exercises intended to develop ability to endure oxygen debt
Development of muscular strength:

- maximum dynamic muscular strength
- enduring dynamic muscular strength
- enduring static muscular strength

Principles of motor learning

Developing reaction ability (e.g. in running and resilience)
Practice of movements
- articulation of joints - preliminary exercises
- bending of joints
- stretching

Warming up

- general warm-up
- partial warm-up
- passive warm-up

Movements

Suitable positions, movements and working methods related to walking, standing, sitting, lying, carrying, pulling, pushing, as well as to various working operations

Tension and relaxation
Physiological conditions

- joints
- muscles
- nervous system (reflexes)

Physio-mechanical conditions

- gravitation, point of gravity
- pendular movement
- kinetic energy - inertia
- stemming
- moments
- lever arm - moment of a force
- direction of a force
- centripetal force

Anatomy and physiology

The skeleton
The nervous system
The muscular system
The organs of blood circulation and respiration; the skin
Internal organs
Neuromuscular functions
Circulation - respiration
Transformation of energy
- during rest
- during work
Balance of liquids
Heat regulation

Health and hygiene

Hygiene

- personal everyday hygiene
- track suit/sportswear

Nutrition and physical activities

- nourishment
- balance of liquids
- transformation of energy
- hormone preparations and stimulants

Mental hygiene

- the recreational values of physical activity

First aid

- minor injuries in everyday life
- injuries sustained during athletic exercises
- resuscitation
- transport of injuries

Outdoor life: safety precautions

- choosing suitable clothes and equipment
- use of map, compass, and choice of route
- learning to know the limits of one's own physical and psychological endurance under various conditions
- assessment of dangerous areas (e.g. risk of avalanches)
- safety rules related to skiing, boating and mountain hikes
- sleeping in the open air
- maintenance of equipment
- hygiene and first aid during long hikes

Ecology and protection of the environment, related to:

- the natural environment during a hike
- the sports ground
- school premises
- residential areas
- working environment
- recreation areas

Sports and games

Bandy, basketball, soccer, ice hockey, handball, water polo, volleyball
Athletics, walking, orienteering, paddling, rowing, skiing, skating, swimming, cycling, tobogganing, badminton, table tennis, wrestling, archery, casting, curling, fencing, golf, riding, shooting, sailing, diving, tennis, gymnastics, weight lifting

Various traditional sports and games in suitable adapted forms, eg rounders

Creative activities

Various types of activity, e.g. ballet and dancing

5 ASSESSMENT

Pupils receive a grade for overall achievement at the end of each year.