WEBINAR WEDNESDAY

IB Insights: The New IB Math Curriculum and University Considerations

October 3, 2018 - Session I
Panelists

- **Peter Chetwynd**, King’s College London, United Kingdom
- **Panetha Ott**, Brown University, United States
- **Merike Remmel**, University of Toronto, Canada
- **Holly Smith**, University of Sussex, United Kingdom
- **Deborah Sutch**, International Baccalaureate Organization, The Netherlands
- **Marie Vivas**, International Baccalaureate Organization, United States
What’s changing?

Currently

Four mathematics subjects are offered.

- Further mathematics HL
- Mathematics HL
- Mathematics SL
- Mathematical studies SL

Final assessment of these subjects will take place in November 2020.

New

First teaching August 2019, first assessment in May 2021.

Two subjects each offered at HL and SL will increase accessibility to more students, appeal to their interests and cater for their future needs.

- Mathematics: analysis and approaches (HL and SL)
- Mathematics: applications and interpretation (HL and SL)
HL and SL: Mathematics: Analysis and approaches

• **Analytic methods** with an emphasis on calculus – appropriate for pure mathematicians, engineers, scientists, economists, those with an interest in analytic methods – current HL mathematics calculus option content will form part of the HL course. This subject is aimed at students who will go on to study subjects with substantial mathematics content such as mathematics itself, engineering, physical sciences, or some economics.

<table>
<thead>
<tr>
<th>Syllabus component</th>
<th>Recommended teaching hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SL</td>
</tr>
<tr>
<td>Number and algebra</td>
<td>19</td>
</tr>
<tr>
<td>Functions</td>
<td>21</td>
</tr>
<tr>
<td>Geometry and trigonometry</td>
<td>25</td>
</tr>
<tr>
<td>Statistics and probability</td>
<td>27</td>
</tr>
<tr>
<td>Calculus</td>
<td>28</td>
</tr>
<tr>
<td>Development of investigational, problem-solving and modelling skills and the exploration</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total teaching hours</strong></td>
<td><strong>150</strong></td>
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</table>
HL and SL: Mathematics: Applications and interpretation

- **Applications and interpretation** with an emphasis on statistics, modelling and use of technology – appropriate for those with an interest in the applications of mathematics and how technology can support this – SL will be appropriate for students who would previously have taken Mathematical studies SL – current HL mathematics statistics and discrete option content will form part of the HL course. This subject is aimed at students who will go on to study subjects such as social sciences, natural sciences, medicine, statistics, business, some economics courses, psychology, and design.

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<tbody>
<tr>
<td></td>
<td>SL</td>
</tr>
<tr>
<td>Number and algebra</td>
<td>16</td>
</tr>
<tr>
<td>Functions</td>
<td>31</td>
</tr>
<tr>
<td>Geometry and trigonometry</td>
<td>18</td>
</tr>
<tr>
<td>Statistics and probability</td>
<td>36</td>
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Rationale for the changes

• Greater choice for students
• Changing needs of the world of work and universities
• Low uptake of Mathematics HL
• Alignment and parity of mathematics within the DP
• Very low uptake of Further mathematics HL
• Perception issues with Mathematical Studies SL
• Increasing emphasis on the use of technology
• To offer schools flexibility in the way they schedule classes
• To offer teachers flexibility in the way they teach the content
The curriculum model

- Applications SL
  - Number and algebra: 16
  - Functions: 18
  - Geometry and trigonometry: 19
  - Statistics and probability: 42
  - Calculus: 36

- Applications HL
  - Number and algebra: 29
  - Functions: 46
  - Geometry and trigonometry: 52
  - Statistics and probability: 41
  - Calculus: 36

- Analysis SL
  - Number and algebra: 19
  - Functions: 21
  - Geometry and trigonometry: 25
  - Statistics and probability: 27
  - Calculus: 28

- Analysis HL
  - Number and algebra: 39
  - Functions: 32
  - Geometry and trigonometry: 51
  - Statistics and probability: 33
  - Calculus: 55
The DP Mathematics assessment model

- **SL**
  - Paper 1
  - 80 marks
  - 90 mins

- **HL**
  - Paper 1
  - 110 marks
  - 120 mins

- **SL**
  - Paper 2
  - 80 marks
  - 90 mins

- **HL**
  - Paper 2
  - 110 marks
  - 120 mins

- **HL**
  - Paper 3
  - 55 marks
  - 60 minutes
  - Problem solving
Five key distinctions in the new curriculum

1) Each subject will be available at SL and HL, with the SL course being a complete subset of the HL course.

2) There will be approximately 60 hours allocated to common SL material across both subject.

3) 30 hours will be allocated to the development of investigational and problem solving skills, collaboration, modelling skills, and completion of the internal assessment (IA) component.

4) The IA is an independent exploration of an area of mathematics chosen by the student. It is internally assessed by the teacher and externally moderated by the IB, contributing 20% to the overall level.

5) HL 3 Paper will be a 1 hour problem-solving/sustained reasoning paper – two scaffolded problems, beginning with a syllabus item and building to either a generalization or an interpretation of the problem.
1) Recognition

Universities and government organizations in countries which take the greatest number of IB graduates have been prioritised with on-going dialogues, a steady exchange of documents, and presentations.
2) Publication dates and professional development

• The guides, TSM, specimen papers will be published at the start of February 2019

• Subject specific seminars (SSS) will begin on 15\textsuperscript{th} February 2019 across all the regions – information can be found on ibo.org
3) Pathways into DP Mathematics

• MYP mathematics (first teaching 2020) will have greater alignment with DP mathematics in terms of content, concepts and aims

• MYP extended mathematics, strong GCSE or IGCSE, Algebra II can lead to either DP mathematics HL courses – strong standard level could do either HL
Summary

The new courses will enable students to:

• develop a curiosity and enjoyment of mathematics, and appreciate its
elegance, beauty and power

• develop a deep, life-long understanding of the concepts, principles and nature
of mathematics

• communicate mathematics clearly, concisely and confidently in a variety of
contexts

• develop logical and creative thinking, and patience and persistence in
problem-solving to instill confidence in using mathematics

• And much more
Helping students make the transition

<table>
<thead>
<tr>
<th>Grade</th>
<th>Current</th>
<th>Recommendation 1</th>
<th>Recommendation 2</th>
<th>Consider</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Mathematical studies SL Year 1</td>
<td>Mathematics applications SL Year 1</td>
<td></td>
<td>If you have candidates regularly achieving high grades in Mathematical studies SL, consider a combined Mathematics application SL/HL in Year 1 and split the classes SL–HL in year 2. Mathematics applications HL Year 1</td>
</tr>
<tr>
<td>12</td>
<td>Mathematical studies SL Year 2</td>
<td>Mathematics applications SL Year 2</td>
<td></td>
<td>Mathematics applications HL Year 2</td>
</tr>
<tr>
<td>11</td>
<td>Mathematics SL Year 1</td>
<td>Mathematics analysis SL Year 1</td>
<td></td>
<td>If you have candidates regularly achieving high grades in Mathematics SL, consider offering Mathematics applications HL Year 1</td>
</tr>
<tr>
<td>12</td>
<td>Mathematics SL Year 2</td>
<td>Mathematics analysis SL Year 2</td>
<td></td>
<td>Mathematics applications HL Year 2</td>
</tr>
<tr>
<td>11</td>
<td>Algebra II</td>
<td>Mathematics applications SL Year 1</td>
<td></td>
<td>If you have students taking a state Algebra II examination, consider adding units in 11th grade on areas not covered (about 30%) in the Mathematics applications SL course.</td>
</tr>
<tr>
<td>12</td>
<td>Mathematical studies SL (one-year course)</td>
<td>Mathematics applications SL Year 2</td>
<td></td>
<td>Note: Mathematics applications SL contains approximately 70% of Algebra II and can be taught without Algebra II as a pre-requisite.</td>
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<td>Mathematics SL</td>
<td>Mathematics applications HL Year 1</td>
<td>Mathematics analysis HL Year 1</td>
<td>Mathematics analysis HL Year 1</td>
</tr>
<tr>
<td>12</td>
<td>AP Calculus AB</td>
<td>Mathematics applications HL Year 1</td>
<td>Mathematics analysis HL Year 1</td>
<td>Mathematics analysis HL Year 1</td>
</tr>
<tr>
<td></td>
<td>Note: This course encompasses most of AP Calculus AB plus additional topics</td>
<td>Mathematics applications SL Year 2</td>
<td>Note: This course contains calculus</td>
<td></td>
</tr>
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<td>11</td>
<td>Mathematical studies SL</td>
<td>Mathematics applications HL Year 1</td>
<td>Mathematics analysis SL Year 1</td>
<td>Note: Recommendation 1 will include more calculus and all of the college introductory statistics.</td>
</tr>
<tr>
<td>12</td>
<td>AP Statistics or College Co-enrolled statistics</td>
<td>Mathematics applications HL Year 2</td>
<td>Mathematics analysis SL Year 2</td>
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</tr>
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<td>Mathematics applications HL Year 1</td>
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<td>If you have candidates regularly achieving high grades in Mathematical studies SL, consider: Mathematics applications HL Year 1</td>
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<td>12</td>
<td>AP Calculus or College Co-enrolled calculus</td>
<td>Mathematics applications SL Year 2</td>
<td>Mathematics analysis SL Year 2</td>
<td>Mathematics applications HL Year 2 Note: This course encompasses AP Calculus plus AP Statistics plus additional topics.</td>
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<td>AP Calculus BC</td>
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<td>Mathematics HL Year 1</td>
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</tr>
<tr>
<td>12</td>
<td>Mathematics HL Year 2 (and/or Further mathematics)</td>
<td>Mathematics analysis HL Year 2</td>
<td>Mathematics applications HL Year 2</td>
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</table>
Provocation Questions For Our University Partners

1. What is the process for your institutions to review courses for admissions/credit? Do you have special processes for math?

2. How would you advise students families and counselors on planning their math sequence for IB?

3. What would you like to learn from schools and the IB about the math courses?
Merike Remmel

http://www.math.toronto.edu/preparing-for-calculus/
Thank you!

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Next month ....Financial Aid: The intricacies, Common Questions and Lesser Known Hacks

November 14, 2018