

## XML (solutions)

### Exercise 1

```
<?xml version="1.0" ?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:simpleType name="levelType">
    <xs:restriction base="xs:string">
      <xs:enumeration value="UG"/>
      <xs:enumeration value="GR"/>
    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="courseType">
    <xs:sequence>
      <xs:element name="number" type="xs:string"/>
      <xs:element name="title" type="xs:string"/>
    </xs:sequence>
    <xs:attribute name="level" type="levelType" default="UG"/>
  </xs:complexType>
  <xs:complexType name="registrationType">
    <xs:sequence>
      <xs:element name="studentID" type="xs:string"/>
      <xs:element name="courseNb" type="xs:string"/>
      <xs:element name="status" type="xs:string" minOccurs="0"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="infoType">
    <xs:sequence>
      <xs:element name="course" type="courseType"
        minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="registration" type="registrationType"
        minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:element name="info" type="infoType">
    <xs:unique name="cons1">
      <xs:selector xpath="./course"/>
      <xs:field xpath="number"/>
    </xs:unique>
    <xs:keyref name="cons2" refer="cons1">
      <xs:selector xpath="./registration"/>
      <xs:field xpath="courseNb"/>
    </xs:keyref>
  </xs:element>
</xs:schema>
```

## Exercise 2

1. the title of undergraduate courses.

```
/info/course[@level='UG']/title
```

2. the level of the "CMPS 378" course.

```
/info/course[number='CMPS 378']/@level
```

3. the registrations for which the status is known.

```
/info/registration[status]
```

4. the second course and the last registration.

```
/info/course[2] | /info/registration[position() = last()]
```

5. the third child of the "info" element.

```
/info/*[3]
```

## Exercise 3

1. the courses that contain "Database" in their title.

```
for    $c in doc("info.xml")/info/course  
where contains($c/title/text(),"Database")  
return $c
```

2. the number of registrations in graduate courses.

```
for    $c in doc("info.xml")/info/course[@level="GR"],  
      $r in doc("info.xml")/info/registration[courseNb=$c/number]  
return count($r)
```

3. For each student, list the studentID and the courseNb of all courses he/she is (or was) registered in, grouped inside a "reg-student" element.

```
for    $s in distinct-values(doc("info.xml")/info/registration/studentID)  
return  
  <reg-student>  
    {$s}  
    {  
      for    $r in doc("info.xml")/info/registration[studentID = $s]  
      return $r/courseNb  
    }  
  </ reg-student >
```