So I wrote this piece of code for solving a system of linear equations using Gauss-Seidel’s Iterative method in the fifth semester of my undergraduate course for my Numerical Analysis Class. Hope you guys find it useful.

```cpp
//Gaus-seidel (Written by: Manas Sharma - University of Delhi)  
#include<iostream>  
#include<iomanip>  
#include<cmath>  
using namespace std;  
int main()  
{  
cout.precision(4);  
cout.setf(ios::fixed);  
int n,i,j,k,flag=0,count=0;  
cout<<"Enter the no. of equations\n";  
cin>>n; //Input no. of equations  
double a[n][n+1]; //declare a 2d array for storing the elements of the  
augmented matrix  
double x[n]; //declare an array to store the values of variables  
double eps,y;  
cout<<"Enter the elements of the augmented matrix row-wise:\n";  
for (i=0;i<n;i++)  
{  
for (j=0;j<=n;j++)  
{  
cin>>a[i][j];  
}  
}  
cout<<"Enter the initial values of the variables:\n";  
for (i=0;i<n;i++)  
{  
cin>>x[i];  
}  
cout<<"Enter the accuracy upto which you want the solution:\n";  
cin>>eps;  
for (i=0;i<n;i++) //Pivotisation(partial) to make the equations  
diagonally dominant  
{  
for (k=i+1;k<n;k++)  
{  
if (abs(a[i][i])<abs(a[k][i]))  
{  
for (j=0;j<=n;j++)  
{  
double temp=a[i][j];  
a[i][j]=a[k][j];  
a[k][j]=temp;  
}  
}  
}  
}  
cout<<"Iter"<<setw(10);  
for(i=0;i<n;i++)  
cout<<"x"<<i<<setw(18);  
cout<<"n-------------------------------------------------------------\n";  
do //Perform iterations to calculate x1,x2,...xn  
{  
cout<<"\n"<<count+1<<"."<<setw(16);  
for (i=0;i<n;i++) //Loop that calculates x1,x2,...xn  
{  
y=x[i];  
x[i]=a[i][n];  
for (j=0;j<n;j++)  
{  
```
Gauss-Seidel (Iterative Method) For System of Linear Equations - C++ Program

```cpp
if (j!=i)
    x[i]=x[i]-a[i][j]*x[j];
} 

x[i]=x[i]/a[i][i];
if (abs(x[i]-y)<=eps)     //Compare the ne value with the last value
    flag++;
    cout<<x[i]<<setw(18);
}
cout<<"\n";
count++;
}while(flag<n);            //If the values of all the variables don't
differ from their previous values with error more than eps then flag must be n and
hence stop the loop

cout<<"\n The solution is as follows: \n";
for (i=0;i<n;i++)
    cout<<x[i]<<endl;        //Print the contents of x[]
return 0;
}
```

Sample Output

```
Enter the no. of equations
3

Enter the elements of the augmented matrix row-wise:
27  6  -1  85
6  15  2  72
1  1  54  110

Enter the initial values of the variables:
0  0  0

Enter the accuracy upto which you want the solution:
0.0001

<table>
<thead>
<tr>
<th>Iter</th>
<th>x0</th>
<th>x1</th>
<th>x2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>3.1481</td>
<td>3.5407</td>
<td>1.9132</td>
</tr>
<tr>
<td>2.</td>
<td>2.4322</td>
<td>3.5720</td>
<td>1.9258</td>
</tr>
<tr>
<td>3.</td>
<td>2.4257</td>
<td>3.5729</td>
<td>1.9260</td>
</tr>
<tr>
<td>4.</td>
<td>2.4255</td>
<td>3.5730</td>
<td>1.9260</td>
</tr>
<tr>
<td>5.</td>
<td>2.4255</td>
<td>3.5730</td>
<td>1.9260</td>
</tr>
</tbody>
</table>

The solution is as follows:
x0 = 2.4255
x1 = 3.5730
x2 = 1.9260
```
Sample Output

More Resources:
More programs on Numerical Analysis:
Lab Write-Up(with Algorithm and Flow-Chart):
Video Explaining the above code:

http://equation-solver.org/
https://en.wikipedia.org/wiki/Equation

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